IN THE UNITED STATES DISTRICT COURT
FOR THE CENTRAL DISTRICT OF CALIFORNIA

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| STATE OF CALIFORNIA DEPARTMENT OF TOXIC SUBSTANCES CONTROL,<br>Plaintiff,<br>v.<br>WESTSIDE DELIVERY, LLC, and DOES 1 through 10, inclusive,<br>Defendants. | Case No. 2:15-cv-07786-SVW (JPRx)<br><br>CONSENT DECREE BETWEEN DTSC AND WESTSIDE DELIVERY, LLC |

## I. INTRODUCTION

1. On October 5, 2015, Plaintiff, the State of California Department of Toxic Substances Control ("DTSC"), filed the complaint ("Complaint") in this matter pursuant to the Comprehensive Environmental Response, Compensation, and Liability Act, 42 U.S.C. §§ 9601-9675 ("CERCLA") and the California Hazardous Substances Account Act ("HSAA"), California Health and Safety Code § 25300 et seq. against Westside Delivery, LLC ("Westside"). In the Complaint, DTSC seeks 1) to recover under CERCLA section 107(a), 42 U.S.C. § 9607(a),

costs it incurred responding to releases and/or threatened releases of hazardous substances at or from the former Davis Chemical Company located at 1550 North Bonnie Beach Place, Los Angeles, California, identified by Los Angeles County Assessor's Parcel Number 5224-026-005 (the "Site"); 2) declaratory relief under CERCLA section 113(g)(2), 42 U.S.C. § 9613(g)(2) that Westside is jointly and severally liable for any future response costs to be incurred by DTSC to address releases and/or threatened releases of hazardous substances at or from the Site; and 3) injunctive relief pursuant to Health and Safety Code section 25358.5 compelling Westside to conduct any necessary future response actions at the Site.

2. In the Complaint, DTSC alleges, in relevant part, the following:

a. The Site is located in the City of Los Angeles.

b. From approximately 1953 to 1990, Davis Chemical Company operated a solvent recycling facility at the Site, which recycled acetone and, to a lesser extent, chlorinated solvents.

c. In 1997, Davis Chemical Company conducted a site investigation that identified the presence of 1,1,2-trichloroethane ("TCE"), perchloroethene ("PCE"), and 1,1,2,2-tetrachloroethane in the soil at the Site.

d. On December 18, 2002, DTSC issued an Imminent and Substantial Endangerment Determination and Remedial Action Order (the "2002 Consent Order"), which included findings that hazardous substances had been released and were present in the soil at the Site in sufficient concentrations to pose a substantial danger to public health and the environment. It further found that there was a potential threat of groundwater contamination from those releases. The 2002 Consent Order directed the respondents thereto to prepare a Remedial Investigation and Feasibility Study and a Remedial Action Plan (the "RAP") for the Site.

e. In 2009, DTSC determined that the work required by the 2002 Consent Order was complete.

f. In 2009, DTSC issued an Imminent and Substantial Endangerment Determination and Remedial Action Order (the "2009 RAO") requiring certain responsible parties to implement the RAP, including excavation and treatment of contaminated soils, and installation of the soil vapor extraction system. The respondents did not comply with the 2009 RAO. In November, 2009, DTSC issued a Final Determination of Noncompliance with the RAO.

g. Westside took title to the Site pursuant to a county tax deed on October 13, 2009 and owned the Site in the period when DTSC incurred response costs.

h. Between 2010 and 2015, DTSC implemented the RAP prepared by the respondents to the 2002 Consent Order.

3. DTSC took response actions necessary to remove and remedy the hazardous substances released and/or threatened to be released at and from the Site. DTSC's response actions included, but were not limited to, the following activities: additional investigations of contamination at the Site; implementation of the RAP; enforcement/cost recovery activities; public participation; and compliance with the California Environmental Quality Act. DTSC's response actions were not inconsistent with the National Contingency Plan, 40 C.F.R. Part 300.

4. As of April 2016, DTSC's unreimbursed Response Costs related to the Site were approximately $2.1 million.

5. Since April 2016, DTSC has incurred significant additional enforcement costs that are response costs.

6. DTSC and Westside (collectively, the "Parties") agree, and this Court, by entering this Consent Decree, finds, that this Consent Decree has been

negotiated by the Parties in good faith, settlement of this matter will avoid expensive, prolonged and complicated litigation between the Parties, and this Consent Decree is fair, reasonable, in the public interest and consistent with the purpose of CERCLA.

**THEREFORE**, the Court, with the consent of the Parties to this Consent Decree, hereby **ORDERS, ADJUDGES, AND DECREES**, as follows:

## II. JURISDICTION

7. The Court has subject matter jurisdiction over the matters alleged in this action pursuant to 28 U.S.C. § 1331, 28 U.S.C. § 1367(a), and CERCLA section 113(b), 42 U.S.C. § 9613(b). It also has personal jurisdiction over each of the Parties. Venue is appropriate in this district pursuant to 28 U.S.C. § 1391(b) and CERCLA section 113(b), 42 U.S.C. § 9613(b). Solely for the purposes of this Consent Decree and the underlying Complaint, Westside waives all objections and defenses that it may have to the jurisdiction of the Court or to venue in this district. Westside shall not challenge the terms of this Consent Decree or this Court's jurisdiction to enter and enforce this Consent Decree.

8. The Court shall retain jurisdiction over this matter for the purpose of interpreting and enforcing the terms of this Consent Decree if necessary.

## III. SETTLEMENT OF DISPUTED CLAIMS

9. Subject to the reservations of rights in Section VII, this Consent Decree resolves all of DTSC's claims against Westside in the above-captioned action. DTSC agrees to resolve Westside's liability in this action in exchange for consideration from Westside, including payment by Westside to reimburse a portion of DTSC's Response Costs incurred at or in connection with releases and/or threatened releases of hazardous substances at and/or from the Site.

10. Nothing in this Consent Decree shall be construed as an admission by Westside of any issue of law or fact or of any violation of law. Except as otherwise

provided by this Consent Decree, this Consent Decree shall not prejudice, waive or impair any right, remedy or defense that Westside may have in any other or further legal proceeding.

11. Westside consents to, and shall not challenge entry of, this Consent Decree or this Court's jurisdiction to enter and enforce this Consent Decree.

12. Upon approval and entry of this Consent Decree by the Court, this Consent Decree shall constitute a final judgment between and among the Parties.

## IV. DEFINITIONS

13. Unless otherwise expressly provided herein, terms used in this Consent Decree that are defined in CERCLA or in regulations promulgated under CERCLA shall have the meaning assigned to them therein. Whenever terms listed below are used in this Consent Decree, the definitions below shall apply.

14. "Day" shall mean shall mean a calendar day. In computing any period of time under this Consent Decree, where the last day would fall on a Saturday, Sunday, or federal or State holiday, the period shall run until the close of business of the next Day.

15. "DTSC" shall mean the State of California Department of Toxic Substances Control and its predecessors and successors. DTSC is a public agency of the State of California organized and existing under and pursuant to California Health and Safety Code §§ 58000-18. Under California law, DTSC is the state agency responsible for determining whether there has been a release and/or threatened release of hazardous substances into the environment, and for determining the actions to be taken in response thereto.

16. "Effective Date" shall mean the date the Court enters an Order approving this Consent Decree.

17. "Fair Market Value" shall mean the highest price on the date of valuation that would be agreed to by a seller, being willing to sell but under no

particular or urgent necessity for so doing, nor obliged to sell, and a buyer, being ready, willing, and able to buy but under no particular necessity for so doing, each dealing with the other with full knowledge of all the uses and purposes for which the property is reasonably adaptable and available.

18. “Parties” shall mean DTSC and Westside.

19. “Qualifying Sale” shall mean a sale of the Site within three (3) years of the Effective Date, unless Westside has made Substantial and Valuable Improvements to the Site.  A Qualifying Sale shall not include the sale of the Site at a tax auction.

20. “Response Costs” shall mean all costs of “removal,” “remedial action,” or “response” (as those terms are defined by section 101 of CERCLA, 42 U.S.C. § 9601), related to the release and/or threatened release of hazardous substances at, beneath, and/or from the Site, including in the soils and groundwater.

21. “Sale Closing Date” shall mean for a Qualifying Sale the date escrow closes for the sale of the Site.

22. “Sale Proceeds” shall mean for a Qualifying Sale the gross sale price for the site, less brokerage commissions, closing costs, and marketing expenses. In calculating the Sale Proceeds, other payments from escrow, including any lien payments or property tax payments, shall not be deducted from the gross sale price.

23. “Site” shall mean the property located at 1550 North Bonnie Beach Place, Los Angeles, California, in the County of Los Angeles, California, identified by Los Angeles County Assessor’s Parcel Number 5224-026-005 and the areal extent of contamination at and emanating from that property, including contamination in the soil or groundwater.

24. "Substantial and Valuable Improvements" shall include the actual construction of significant structural improvements, such as a new building or buildings, or other physical improvements that places the property into productive

use (including, for example, grading and paving the whole property to be a parking lot), but does not include permit approvals or grants of entitlement for construction of significant structural improvements, such as a new building or buildings and does not include minor physical improvements such as fencing.

## V. WESTSIDE'S OBLIGATIONS

25. Westside or its designee shall pay DTSC $175,000 within thirty (30) Days of the Effective Date.

26. For the period of three (3) years from the Effective Date, Westside will give DTSC written and email notice of any sale agreement Westside enters for the Site or of any notice Westside receives that the Site will be offered at a tax auction. Westside will give such notice within five (5) days of either entering the agreement or receiving notice of the tax sale.

27. In the event of a Qualifying Sale, Westside shall comply with the following:

a. The sale price shall be no less than the Fair Market Value of the Site.

b. Within thirty (30) Days of the Sale Closing Date, Westside shall convey the following information to DTSC: 1) the gross sale price; 2) the Sale Proceeds, 3) the total property tax that Westside has paid for the Site up to the Sale Closing Date and 4) the legal fees directly related to the Site that Westside owes to Allen Matkins (including for services previously provided). Westside shall provide documentation of the foregoing information. The adequacy of that documentation will be subject to DTSC's approval, which approval will not be unreasonably withheld.

c. In the event the Net Sale Proceeds exceeds the sum of 1) $175,000 (Westside's payment to DTSC); 2) $80,000 (Westside's purchase price); 3) Westside's property tax payments for the Site as documented

pursuant to Paragraph b; and 4) Westside's legal fees as documented pursuant to Paragraph b, then Westside shall pay half of the amount exceeding that sum to DTSC. That payment shall be due within thirty (30) Days of the Sale Closing Date.

28. In the event that the Site is sold in a tax auction, any proceeds from that sale are conveyed to Westside pursuant to the Revenue and Taxation Code, and the amount conveyed to Westside exceeds the sum of 1) $175,000 (Westside's payment to DTSC); 2) $80,000 (Westside's purchase price); and 3) Westside's legal fees as documented pursuant to Paragraph 27.b, then Westside shall pay half of the amount exceeding that sum to DTSC. That payment shall be due within thirty (30) Days of the date that Westside receives the payment.

29. The payment(s) specified in Paragraph 25 and (if any) Paragraph 27 shall be made by certified or cashier's check(s) made payable to Cashier, California Department of Toxic Substances Control, and shall bear on its face both the docket number of this proceeding and the phrase "Site Code 300432." On request, DTSC will provide instructions for payment by electronic funds transfer.

The payment shall be sent to:

Cashier
Accounting Office, MS-21A
California Department of Toxic Substances Control
1001 I Street
P.O. Box 806
Sacramento, CA 95812-0806

A copy of the check shall be mailed to:

Robert Sullivan, Attorney
California Department of Toxic Substances Control
Office of Legal Counsel, MS-23A
1001 I Street
P.O. Box 806
Sacramento, CA 95812-0806

Or e-mailed to Robert.Sullivan@dtsc.ca.gov in .pdf or .jpg format.

30. No later than thirty (30) Days after the Effective Date, Westside shall record the land-use covenant for the Site that appears as Exhibit A to this Consent

Decree. Nothing herein shall prevent Westside from recording the land-use covenant prior to thirty (30) Days after the Effective Date."

31. No later than thirty (30) Days after the Effective Date, Westside shall dismiss with prejudice its appeal in *State of Cal. DTSC v. Westside Delivery, LLC, et al.,* 9th Circuit Case No. 18-55868, CDCA Case No. 2:17-cv-00785-R-RAO (9th Cir., filed 06/28/18). This requirement shall be moot if the appeal is no longer pending.

32. This Consent Decree is conditioned upon full execution of Westside's obligations in Paragraphs 25 through 31. If these conditions are not met, then this Consent Decree, including the covenant not to sue in Section VI, shall be voidable at the discretion of DTSC, and DTSC may proceed to litigate the Complaint against Westside.

33. Within thirty (30) Days after Westside makes the payment required by Paragraph 25, DTSC shall terminate the lien it imposed on the Site.

## VI. COVENANT NOT TO SUE BY DTSC

34. Except as expressly provided in Section VII (DTSC's Reservation of Rights) of this Consent Decree, DTSC covenants not to sue Westside pursuant to CERCLA, the California Hazardous Substances Account Act, Cal. Health & Safety Code sections 25300-25395.3 to: (a) recover DTSC's Response Costs related to the Site, including Response Costs associated with groundwater remediation relating to any hazardous substances released at the Site; or (b) require Westside to conduct response actions, including removal or remedial actions, related to the release and/or threatened release of hazardous substances at or from the Site, including the soil and groundwater. As stated in Paragraph 32, this Covenant Not to Sue is conditioned upon the complete and satisfactory performance by Westside of all its obligations under this Consent Decree.

## VII. DTSC'S RESERVATION OF RIGHTS

35. Claims Regarding Other Matters. DTSC reserves, and this Consent Decree is without prejudice to, all rights against Westside with respect to all matters not expressly included within DTSC's Covenant Not to Sue (Section VI).

36. Reservation of Claims. DTSC reserves, and this Consent Decree is without prejudice to, all rights against Westside with respect to the following matters:

a. Failure of Westside to meet the requirements of this Consent Decree;

b. Damage to natural resources, as defined in CERCLA section 101(6), 42 U.S.C. § 9601(6), including all costs incurred by any natural resources trustees;

c. Liability resulting Westside's introduction of any hazardous substance, pollutant, or contaminant to the Site after the Effective Date;

d. Liability resulting from overt acts by Westside after the Effective Date that cause the exacerbation of the hazardous substance conditions existing at or from the Site;

e. Claims based on liability arising from the past, present, or future disposal of hazardous substances at sites or locations other than the Site; and

f. Claims based on criminal liability.

37. Government Authority. Except as expressly provided in the Consent Decree, nothing in the Consent Decree is intended nor shall it be construed to preclude DTSC from exercising its authority under any law, statute or regulation. Furthermore, nothing in the Consent Decree is intended, nor shall it be construed, to preclude any other state agency, department, board or entity or any federal entity from exercising its authority under any law, statute or regulation.

38. Claims Against Other Persons. DTSC reserves, and this Consent Decree is without prejudice to, all rights, claims, and causes of action DTSC may have against any person other than Westside. Nothing in this Consent Decree is intended to be nor shall it be construed as a release, covenant not to sue, or compromise of any claim or cause of action, which DTSC may have against any person or other entity that is not Westside.

39. Unknown Conditions/New Information. Notwithstanding any other provision in the Consent Decree, DTSC reserves, and this Consent Decree is without prejudice to, the right to institute proceedings in this action or in a new action, and/or to issue an administrative order seeking to compel Westside to perform response activities at the Site and/or to pay DTSC for additional Response Costs, if:

a. conditions previously unknown to DTSC, for which Westside is liable under any statute or law, are discovered at the Site after the Effective Date, and these conditions indicate that a hazardous substance has been or is being released at the Site or there is a threat of such release into the environment and that the response performed at the Site is not protective of human health and the environment ("Unknown Conditions"); or

b. DTSC receives information after the Effective Date that was not available to DTSC at the time of the Effective Date, concerning matters for which Westside is liable, and that information results in a determination that the response performed at the Site is not protective of human health and the environment ("New Information").

## VIII. COVENANT NOT TO SUE BY WESTSIDE

40. Westside covenants not to sue, and agrees not to assert any claims or causes of action against DTSC or any DTSC contractors or employees that arise out of the transaction or occurrence that is the subject matter of the Complaint, or for

any injuries, losses, costs, or damages caused or incurred as a result of the performance of the requirements of this Consent Decree or the DTSC's response actions at the Site.

41. This Section VIII (Covenant Not to Sue by Westside) does not pertain to any matters other than those specifically addressed in this Consent Decree, applies only to DTSC and does not extend to any other department, agency, board or body of the State of California. Westside reserves, and this Consent Decree is without prejudice to, all rights against DTSC with respect to all other matters not expressly included within the scope of this Consent Decree.

42. In any legal proceedings that DTSC may initiate against Westside for non-compliance with this Consent Decree, and subject to this Consent Decree, Westside may raise any and all defenses that Westside deems to be relevant to the issue of whether or not they have complied with the terms of this Consent Decree.

## IX. EFFECT OF SETTLEMENT AND CONTRIBUTION PROTECTION

43. With regard to claims for contribution against Westside for "Matters Addressed" in this Consent Decree, the Parties agree, and the Court finds as follows:

a. This Consent Decree constitutes a judicially approved settlement within the meaning of CERCLA section 113(f)(2), 42 U.S.C. § 9613(f)(2).

b. This Consent Decree requires that Westside pay certain costs with respect to its alleged liability at the Site.

c. Westside is entitled to the contribution protection provided by CERCLA section 113(f)(2), 42 U.S.C. § 9613(f)(2), and by state statutory and common law for the "Matters Addressed" in this Consent Decree, except for actions and claims identified in Section VII (DTSC's Reservation of Rights).

44. "Matters Addressed". The "Matters Addressed" in this Consent Decree are all response actions taken or to be taken and all Response Costs incurred or to be incurred at or in connection with the Site by DTSC.

45. The protection provided for in this Section IX is conditioned upon compliance by Westside with its obligations under Paragraphs 25 through 31 of this Consent Decree.

46. Nothing in this Consent Decree limits or impairs the right of DTSC to pursue any person other than Westside for unrecovered Response Costs incurred by DTSC.

47. The Court shall retain jurisdiction over this matter for the purpose of interpreting and enforcing the terms of this Consent Decree if necessary.

## X. NOTIFICATION

48. Notification to or communication among the Parties as required or provided for in this Consent Decree shall be addressed as follows:

For DTSC:

Safouh Sayed, Project Manager
Cypress Cleanup Program
California Department of Toxic Substances Control
Corporate Avenue
Cypress, CA 91311-6505

Robert Sullivan
California Department of Toxic Substances Control
Office of Legal Counsel, MS-23A
P.O. Box 806
Sacramento, CA 95812-0806

For Westside:

Emily Murray
Allen Matkins Leck Gamble Mallory & Natsis LLP
865 South Figueroa Street, Suite 2800
Los Angeles, CA 90017-2543

## XI. GENERAL PROVISIONS

49. Parties Bound. This Consent Decree shall apply to, be binding upon, and inure to the benefit of the Parties and their representatives, successors, heirs, legatees, and assigns.

50. No Rights in Other Parties. Except as provided in Paragraph 49 regarding parties bound, nothing in this Consent Decree shall be construed to create any rights in, or grant any cause of action to, any person not a Party to this Consent Decree or a Related Person.

51. No Waiver of Enforcement. The failure of DTSC to enforce any provision of this Consent Decree shall in no way be deemed a waiver of such provision or in any way affect the validity of this Consent Decree. The failure of DTSC to enforce any such provision shall not preclude it from later enforcing the same or any other provision of this Consent Decree.

52. Attorneys' Fees. Except as expressly provided in this Consent Decree, the Parties will not seek to recover attorneys' fees and/or litigation costs against each other.

53. Final Agreement. This Consent Decree constitutes the final, complete and exclusive agreement and understanding between the Parties with respect to the settlement embodied in this Consent Decree.

54. Modifications. This Consent Decree may be modified only upon written approval of the Parties and with the consent of the Court.

55. Signatories. Each signatory to this Consent Decree certifies that he or she is fully authorized by the Party he or she represents to enter into the terms and conditions of this Consent Decree, to execute it on behalf of the Party represented, and to legally bind that Party to all the terms and conditions of this Consent Decree.

56. Counterparts. This Consent Decree may be executed in two or more counterparts, each of which shall be deemed an original, but all of which together shall constitute one and the same instrument.

57. Agent. Westside has appointed and authorized the agents identified in Paragraph 48 to this Consent Decree to receive notices with respect to all matters arising under or relating to this Consent Decree.

**XII. ENTRY OF THE CONSENT DECREE**

58. This Consent Decree shall be lodged with the Court for a period of not less than thirty (30) Days. The Consent Decree also is subject to a public comment period of not less than thirty (30) Days. DTSC may modify or withdraw its consent to this Consent Decree if comments received during the public comment period disclose facts or considerations that indicate that this Consent Decree is inappropriate, improper or inadequate. Westside consents to the entry of this Consent Decree without further notice.

59. If, for any reason, the Court declines to approve this Consent Decree in the form presented, this Consent Decree is voidable at the sole discretion of any Party and the terms of the Consent Decree may not be used as evidence in any litigation between the Parties.

60. Upon entry of this Consent Decree by the Court, this Consent Decree shall constitute the final judgment between DTSC and Westside.

The Court finds that there is no just reason for delay and therefore enters this judgment as a final judgment under Fed. R. Civ. P. 54 and 58.

**IT IS SO ORDERED, ADJUDGED, AND DECREED.**

Dated: April 25, 2019

Stephen V. Wilson

United States District Judge
STEPHEN V. WILSON

Party Signatures on pages to follow

APPROVED AS TO FORM AND CONTENT:

Dated:

James Potter
Deputy Attorney General
Attorney for Plaintiff Department of Toxic Substances Control

Dated: Dec. 14, 2018

Emily Murray
Allen Matkins Leck Gamble Mallory & Natsis LLP
865 South Figueroa Street, Suite 2800,
Los Angeles, CA 90017-2543
Attorney for Settling Defendant Westside Delivery LLC

APPROVED AS TO FORM AND CONTENT:

Dated: 12/14/18

James Potter
Deputy Attorney General
Attorney for Plaintiff Department of Toxic Substances Control

Dated: Dec. 14, 2018

Emily Murray
Allen Matkins Leck Gamble Mallory & Natsis LLP
865 South Figueroa Street, Suite 2800,
Los Angeles, CA 90017-2543
Attorney for Settling Defendant
Westside Delivery LLC

CALIFORNIA DEPARTMENT OF TOXIC SUBSTANCES CONTROL

DATE: 12-21-18

By: ______________________
SIGNATURE

______________________
Peter A. Garcia

______________________
Chief, Southern California Division
Site Mitigation & Restoration Program

WESTSIDE DELIVERY, INC.

DATE: 12/14/18

By: ______________________
SIGNATURE

Brian Corman
NAME (printed or typed)

President
TITLE (printed or typed)

Agent Authorized to Accept Service on Behalf of Above-signed Party:

Name: Andrew Grey

Title: ______________________

Company: ______________________

Address: 16633 Ventura Blvd, 6th Floor
Encino, CA 91436

Phone: ______________________

email: ______________________

Exhibit A

RECORDING REQUESTED BY
Department of Toxic Substances Control

and

Westside Delivery, LLC
11693 San Vicente Blvd # 579
Los Angeles, CA 90049

WHEN RECORDED MAIL TO:

Department of Toxic Substances Control
5796 Corporate Ave
Cypress, California 90630
Attention: Robert Senga, Unit Chief
Brownfields and Environmental Restoration Program

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(Space Above For Recorder's Use)

LAND USE COVENANT AND AGREEMENT

ENVIRONMENTAL RESTRICTIONS

County of Los Angeles, Assessor Parcel Number(s): 5224-026-005
Davis Chemical Site
Department Site Code: 300432

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This Land Use Covenant and Agreement ("Covenant") is made by and between Westside Delivery, LLC, (the "Covenantor"), the current owner of property located at 1550 North Bonnie Beach Place, in the County of Los Angeles, State of California (the "Property"), and the Department of Toxic Substances Control (the "Department"). Pursuant to Civil Code section 1471, the Department has determined that this Covenant is reasonably necessary to protect present or future human health or safety or the environment as a result of the presence on the land of hazardous materials as defined in Health and Safety Code section 25260. The Covenantor and the Department hereby agree that, pursuant to Civil Code section 1471 and Health and Safety Code, sections 25227 and 25355.5, the use of the Property shall be restricted as set forth in this Covenant and that the Covenant shall conform with the requirements of California Code of Regulations, title 22, section 67391.1.

## ARTICLE I
## STATEMENT OF FACTS

1.1. Property Location. The Property that is subject to this Covenant, totaling approximately ***1/3 acres*** is more particularly described in the attached Exhibit A, "Legal Description", and depicted in Exhibit B. The Property is located in an area that consists of light industrial facilities with exception of a residence located on an adjacent property uphill and to the south southeast of the site. The Property is also identified as County of Los Angeles, Assessor Parcel Number(s) 5224-026-005.

1.2. Remediation of Property. This Property has been investigated and/or remediated under the Department's oversight. The Department approved a ***Remedial Action Plan,*** in accordance with Health and Safety Code, division 20, chapter 6.8. The remedial activities conducted at the Property include excavation of soil impacted by volatile organic compounds (VOCs) and installation of a soil vapor extraction (SVE) system. Hazardous substances, including PCE at concentrations up to 43 ppm, TCE at concentrations up to 35 ppm, and cis-1,2-DCE at concentrations up to 2.0 ppm, remain at the Property above levels acceptable for unrestricted land use.

1.3. Human Health Risk Assessment. In connection with the Remedial Action Plan, a ***Screening Human Health Risk Assessment and Presumptive Feasibility Study Report*** (HHRA) was prepared to assess the human health risk following completion of the remediation pursuant to the Remedial Action Plan. A copy of the HHRA is attached hereto as Exhibit C. The HHRA assumed that the remediated Property would be regraded for commercial and/or industrial development based on the needs of the Property owner. (HHRA pg. 47.) The HHRA concluded that the preferred remedial alternative under the Remedial Action Plan would eliminate or reduce to acceptable levels the identified risks from the soils, and would provide a long-term, permanent solution to allow the Property to be developed for future commercial or industrial use. (HHRA pg. 51.)

1.4. Basis for Environmental Restrictions. As a result of the presence of hazardous substances, which are also hazardous materials as defined in Health and

Safety Code section 25260, at the Property, the Department has concluded that it is reasonably necessary to restrict the use of the Property in order to protect present or future human health or safety or the environment, and that this Covenant is required as part of the Department-approved remedy for the Property. The Department has also concluded that the Property, as remediated and when used in compliance with the Environmental Restrictions of this Covenant, does not present an unacceptable risk to present and future human health or safety or the environment.

## ARTICLE II
## DEFINITIONS

2.1. Department. "Department" means the California Department of Toxic Substances Control and includes its successor agencies, if any.

2.2. Environmental Restrictions. "Environmental Restrictions" means all protective provisions, covenants, restrictions, requirements, prohibitions, and terms and conditions as set forth in this Covenant.

2.3. Improvements. "Improvements" includes, but is not limited to buildings, structures, roads, driveways, improved parking areas, wells, pipelines, or other utilities.

2.4. Lease. "Lease" means lease, rental agreement, or any other document that creates a right to use or occupy any portion of the Property.

2.5. Occupant. "Occupant" or "Occupants" means Owner and any person or entity entitled by ownership, leasehold, or other legal relationship to the right to occupy any portion of the Property.

2.6. Owner. "Owner" or "Owners" means the Covenantor, and any successor in interest including any heir and assignee, who at any time holds title to all or any portion of the Property.

## ARTICLE III
## GENERAL PROVISIONS

3.1. Runs with the Land. This Covenant sets forth Environmental Restrictions that apply to and encumber the Property and every portion thereof no matter how it is improved, held, used, occupied, leased, sold, hypothecated, encumbered, or conveyed. This Covenant: (a) runs with the land pursuant to Civil Code section 1471 and Health and Safety Code section 25355.5; (b) inures to the benefit of and passes with each and every portion of the Property; (c) is for the benefit of, and is enforceable by the Department; and (d) is imposed upon the entire Property unless expressly stated as applicable only to a specific portion thereof.

3.2. Binding upon Owners/Occupants. This Covenant: (a) binds all Owners of the Property, their heirs, successors, and assignees; and (b) the agents, employees, and lessees of the Owners and the Owners' heirs, successors, and assignees. Pursuant to Civil Code section 1471, all successive Owners of the Property are expressly bound hereby for the benefit of the Department; this Covenant, however, is binding on all Owners and Occupants, and their respective successors and assignees, only during their respective periods of ownership or occupancy except that such Owners or Occupants shall continue to be liable for any violations of, or non-compliance with, the Environmental Restrictions of this Covenant or any acts or omissions during their ownership or occupancy.

3.3. Incorporation into Deeds and Leases. This Covenant shall be incorporated by reference in each and every deed and Lease for any portion of the Property entered into after the date of recordation of this Covenant.

3.4. Conveyance of Property. The Owner and new Owner shall provide Notice to the Department not later than 30 calendar days after any conveyance or receipt of any ownership interest in the Property (excluding Leases, and mortgages, liens, and other non-possessory encumbrances). The Notice shall include the name and mailing address of the new Owner of the Property and shall reference the site name and site code as listed on page one of this Covenant. The notice shall also include the Assessor's Parcel

Number(s) noted on page one. If the new Owner's property has been assigned a different Assessor Parcel Number, each such Assessor Parcel Number that covers the Property must be provided. The Department shall not, by reason of this Covenant, have authority to approve, disapprove, or otherwise affect proposed conveyance, except as otherwise provided by law or by administrative order.

3.5. Costs of Administering the Covenant to Be Paid by Owner. The Department has already incurred and will in the future incur costs associated with this Covenant. Therefore, the Covenantor hereby covenants for the Covenantor and for all subsequent Owners that, pursuant to California Code of Regulations, title 22, section 67391.1(h), the Owner agrees to pay the Department's costs in administering, implementing and enforcing this Covenant incurred after the date of recordation of this Covenant.

## ARTICLE IV
## RESTRICTIONS AND REQUIREMENTS

4.1. Restricted Uses. Health and Safety Code, section 25227 provides that a person shall not engage in any of the following on land that is subject to a recorded land use restriction pursuant to Health and Safety Code, section 25355.5, unless the person obtains a specific approval in writing from the Department for the land use on the land in question:

(a) A new use of the land, other than the use, modification, or expansion of an existing industrial or manufacturing facility or complex on land that is owned by, or held for the beneficial use of, the facility or complex on or before January 1, 1981.

(b) Subdivision of the land, as that term is used in Division 2 (commencing with Section 66410) of Title 7 of the Government Code , except that this subdivision does not prevent the division of a parcel of land so as to divide that portion of the parcel that contains hazardous materials, as defined in subdivision (d) of Section 25260 , from other portions of that parcel.

(c) Construction or placement of a building or structure on the land that is intended for use as any of the following, or the new use of an existing structure for the purpose of serving as any of the following:

(1) (A) Except as provided in subparagraph (B), a residence, including a mobile home or factory built housing constructed or installed for use as permanently occupied human habitation.

(B) The addition of rooms or living space to an existing single-family dwelling or other minor repairs or improvements to residential property that do not change the use of the property, increase the population density, or impair the effectiveness of a response action, shall not constitute construction or placement of a building or structure for the purposes of subparagraph (A).

(2) A hospital for humans.

(3) A school for persons under 21 years of age.

(4) A day care center for children.

(5) A permanently occupied human habitation, other than those used for industrial purposes.

4.2. Permitted Uses. Consistent with Health and Safety Code, section 25227, and as documented in the HHRA, the Department does not consider the use of the Property for commercial or industrial use a new use. The development and use of the Property for future commercial and/or industrial uses remains subject to the soil management requirements and prohibited activities listed herein. Should site conditions be altered beyond those conditions in the approved HHRA, an updated HHRA may be required by the Department.

4.3. Soil Management. Soil management activities at the Property are subject to the following requirements in addition to any other applicable Environmental Restrictions:

(a) No activities that will disturb the soil (e.g., excavation, grading, removal, trenching, filling, earth movement, mining, or drilling) shall be allowed at the Property without a Soil Management Plan pre-approved by the Department in writing.

(b) Any soil brought to the surface by grading, excavation, trenching or backfilling shall be managed in accordance with all applicable provisions of state and federal law.

4.4. Prohibited Activities. The following activities shall not be conducted at the Property:

(a) Drilling for any water, oil, or gas without prior written approval by the Department.

(b) Extraction or removal of groundwater without a Groundwater Management Plan pre-approved by the Department in writing.

4.5. Access for Department. The Department shall have reasonable right of entry and access to the Property for inspection, investigation, remediation, monitoring, and other activities as deemed necessary by the Department in order to protect human health or safety or the environment.

4.6. Annual Inspection and Reporting Requirements. The Owner shall conduct an annual inspection of the Property verifying compliance with this Covenant and shall submit an annual inspection report to the Department for its approval by January 30 of each year. The annual inspection report should include the dates, times, and names of those who conducted the inspection and reviewed the annual inspection report. It also should describe how the observations that were the basis for the statements and conclusions in the annual inspection report were performed (e.g., drive by, fly over, walk in, etc.). If any violation is noted, the annual inspection report must detail the steps taken to correct the violation and return to compliance. If the Owner identifies any violations of this Covenant during the annual inspection or at any other time, the Owner must within 10 calendar days of identifying the violation: (a) determine the identity of the party in

violation; (b) send a letter advising the party of the violation of the Covenant; and (c) demand that the violation cease immediately. Additionally, a copy of any correspondence related to the violation of this Covenant shall be sent to the Department within 10 calendar days of its original transmission.

4.7. Five-Year Review. As set forth in Sections 1.2 and 1.4, the Property was remediated under the Department's oversight, and this Covenant is required as part of the Department-approved remedy for the Property. The Department has also concluded that the Property, as remediated and when used in compliance with the Environmental Restrictions of this Covenant, does not present an unacceptable risk to present and future human health or safety or the environment. In addition to the annual reviews noted above, after a period of five (5) years from date of recordation of this Covenant and every five (5) years thereafter, Owner shall submit a Five-Year Review report documenting continued compliance with the Environmental Restrictions of this Covenant. The report shall describe the results of all inspections and any sampling analyses, tests and other data generated or received by Owner. As a result of any review work performed, DTSC may require Owner to perform additional review work or modify the review work previously performed by Owner.

## ARTICLE V
## ENFORCEMENT

5.1. Enforcement. Failure of the Owner or Occupant to comply with this Covenant shall be grounds for the Department to require modification or removal of any Improvements constructed or placed upon any portion of the Property in violation of this Covenant. Violation of this Covenant shall be grounds for the Department to pursue administrative, civil, or criminal actions, as provided by law.

## ARTICLE VI
## VARIANCE, REMOVAL AND TERM

6.1. Variance from Environmental Restrictions. Any person may apply to the Department for a written variance from any of the Environmental Restrictions imposed by

this Covenant. Such application shall be made in accordance with Health and Safety Code section 25223.

6.2. Removal of Environmental Restrictions. Any person may apply to the Department to remove any of the Environmental Restrictions imposed by this Covenant or terminate the Covenant in its entirety. Such application shall be made in accordance with Health and Safety Code section 25224.

6.3. Term. Unless ended in accordance with paragraph 6.2, by law, or by the Department in the exercise of its discretion, this Covenant shall continue in effect in perpetuity.

## ARTICLE VII
## MISCELLANEOUS

7.1. No Dedication Intended. Nothing set forth in this Covenant shall be construed to be a gift or dedication, or offer of a gift or dedication, of the Property, or any portion thereof, to the general public or anyone else for any purpose whatsoever.

7.2. Recordation. The Covenantor shall record this Covenant, with all referenced Exhibits, in the County of Los Angeles within 10 calendar days of the Covenantor's receipt of a fully executed original.

7.3. Notices. Whenever any person gives or serves any Notice ("Notice" as used herein includes any demand or other communication with respect to this Covenant), each such Notice shall be in writing and shall be deemed effective: (a) when delivered, if personally delivered to the person being served or to an officer of a corporate party being served; or (b) five calendar days after deposit in the mail, if mailed by United States mail, postage paid, certified, return receipt requested:

To Owner:

Westside Delivery, LLC
11693 San Vicente Blvd # 579
Los Angeles, CA 90049

And

To Department:

5796 Corporate Ave
Cypress, California 90630
Attention: Robert Senga, Unit Chief
Brownfields and Environmental Restoration Program

Any party may change its address or the individual to whose attention a Notice is to be sent by giving advance written Notice in compliance with this paragraph.

7.4. Partial Invalidity. If this Covenant or any of its terms are determined by a court of competent jurisdiction to be invalid for any reason, the surviving portions of this Covenant shall remain in full force and effect as if such portion found invalid had not been included herein.

7.5. Statutory References. All statutory or regulatory references include successor provisions.

7.6. Incorporation of Exhibits. All exhibits and attachments to this Covenant are incorporated herein by reference.

[SIGNATURES ON NEXT PAGE]

IN WITNESS WHEREOF, the Covenantor and the Department hereby execute this Covenant.

Covenantor: Westside Delivery LLC

By: ____________________________________________

Title: ____________________________________________
Print Name and Title of Signatory

Date: ____________________________________________

Department of Toxic Substances Control:

By: ____________________________________________

Title: ____________________________________________
Print Name and Title of Signatory

Date: ____________________________________________

## ACKNOWLEDGMENT

| |
|---|
| A notary public or other officer completing this certificate verifies only the identity of the individual who signed the document to which this certificate is attached, and not the truthfulness, accuracy, or validity of that document. |

State of California )
County of ______________________ )

On __________________________, before me, ____________________________,
(insert name of notary)
Notary Public, personally appeared __________________________________________, who proved to me on the basis of satisfactory evidence to be the person(s) whose name(s) is/are subscribed to the within instrument and acknowledged to me that he/she/they executed the same in his/her/their authorized capacity(ies), and that by his/her/their signature(s) on the instrument the person(s), or the entity upon behalf of which the person(s) acted, executed the instrument.

I certify under PENALTY OF PERJURY under the laws of the State of California that the foregoing paragraph is true and correct.

WITNESS my hand and official seal.

Signature ______________________________ (Seal)

# ACKNOWLEDGMENT

| |
|---|
| A notary public or other officer completing this certificate verifies only the identity of the individual who signed the document to which this certificate is attached, and not the truthfulness, accuracy, or validity of that document. |

State of California )
County of ______________________ )

On _________________________, before me, ___________________________,
(insert name of notary)
Notary Public, personally appeared __________________________________________, who proved to me on the basis of satisfactory evidence to be the person(s) whose name(s) is/are subscribed to the within instrument and acknowledged to me that he/she/they executed the same in his/her/their authorized capacity(ies), and that by his/her/their signature(s) on the instrument the person(s), or the entity upon behalf of which the person(s) acted, executed the instrument.

I certify under PENALTY OF PERJURY under the laws of the State of California that the foregoing paragraph is true and correct.

WITNESS my hand and official seal.

Signature ______________________________ (Seal)

## EXHIBIT A

## LEGAL DESCRIPTION

The legal description of the property is as follows:

TRACT # 6479 LOTS 9 AND LOT 10 BLK G

APN: 5224-026-005

**EXHIBIT B**

**SITE**

**Exhibit C**

# SCREENING HUMAN HEALTH RISK ASSESSMENT AND PRESUMPTIVE FEASIBILITY STUDY REPORT
# DAVIS CHEMICAL SITE
# 1550 NORTH BONNIE BEACH PLACE
# LOS ANGELES, CALIFORNIA

*Presented to*

Department of Toxic Substances Control
Cypress, California

*Prepared for*

Heller Ehrman White & McAuliffe, LLP
San Francisco, California

*Prepared by*

ENVIRON International Corporation
Irvine, California

February 15, 2005

*Prepared by:*

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CIVIL
STATE OF CALIFORNIA

Houshang Dezfulian, Ph.D., P.E.
Principal

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## FIGURES



## APPENDICES

# LIST OF ACRONYMS AND ABBREVIATIONS

| | |
|---|---|
| ARAR | Applicable or Relevant and Appropriate Requirements |
| bgs | Below Ground Surface |
| CAA | Clean Air Act |
| CAG | Carcinogen Assessment Group |
| Cal/EPA | California Environmental Protection Agency |
| Cal OSHA | California Occupational Safety and Health |
| CBCEC | California Base Closure Environmental Committee |
| CCR | California Code of Regulations |
| CERCLA | Comprehensive Environmental Response, Compensation, and Liability Act |
| CFR | Code of Federal Regulations |
| COPC | Chemical of Potential Concern |
| CSF | Cancer Slope Factor |
| CSM | Conceptual Site Model |
| CWA | Clean Water Act |
| DHS | Department of Health Services |
| DTSC | (California) Department of Toxic Substances Control |
| EA | Each |
| FIFRA | Federal Insecticide, Fungicide, and Rodenticide Act |
| FS | Feasibility Study |
| GAC | Granular Activated Carbon |
| HEAST | Health Effects Assessment Summary Tables |
| HHRA | Human Health Risk Assessment |
| HSAA | (California) Hazardous Substances Account Act |
| HI | Hazard Index |
| HRS | Hours |
| HWCA | Hazardous Waste Control Act |
| IRIS | Integrated Risk Information System |
| M | Month |
| NCEA | National Center for Environmental Assessment |

## LIST OF ACRONYMS AND ABBREVIATIONS (continued)

| | |
|---|---|
| NCP | National Contingency Plan |
| NEPA | National Environmental Policy Act |
| O&M | Operation and Maintenance |
| OSHA | Occupational Safety and Health Administration |
| OVA | Organic Vapor Analyzer |
| PAH | Polynuclear (or Polycyclic) Aromatic Hydrocarbons |
| PCB | Polychlorinated Biphenyl |
| PCE | Tetrachloroethene |
| PEA | Preliminary Endangerment Assessment |
| PEF | Particulate Emission Factor |
| PRG | Preliminary Remediation Goal |
| Q/C | Inverse of Mean Concentration at Center of a Square Source |
| RAO | Remedial Action Objective |
| RBTC | Risk-Based Target Concentration |
| RCRA | Resource Conservation and Recovery Act |
| RfC | Reference Concentration |
| RfD | Reference Dose |
| RI | Remedial Investigation |
| RL | Reporting Limit |
| RME | Reasonable Maximum Exposure |
| SARA | Superfund Amendments and Reauthorization Act |
| SCAQMD | South Coast Air Quality Management District |
| SDWA | Safe Drinking Water Act |
| SVE | Soil Vapor Extraction |
| SVOC | Semi-Volatile Organic Compound |
| SWPPP | Storm Water Pollution Prevention Plan |
| TCA | Tricholorethane |
| TCE | Trichloroethene (or Trichloroethylene) |
| TMB | Trimethylbenzene |
| TPH | Total Petroleum Hydrocarbon |

## LIST OF ACRONYMS AND ABBREVIATIONS
## (continued)

| | |
|---|---|
| TSCA | Toxic Substances Control Act |
| TTU | Transportable Treatment Unit |
| USEPA | United States Environmental Protection Agency |
| VOC | Volatile Organic Compound |
| atm | atmosphere |
| cm | centimeter |
| g | grams |
| kg | kilogram |
| lb | pound |
| $m^2$ | square meter |
| $m^3$ | cubic meter |
| µg | microgram |
| mg | milligram |
| s | second |
| a | Soil Vapor Attenuation Coefficient |

# EXECUTIVE SUMMARY

On behalf of the Respondents to the Consent Order issued by the California Environmental Protection Agency (Cal/EPA) Department of Toxic Substances Control (DTSC) on December 17, 2002 for the Davis Chemical Company site, located at 1550 North Bonnie Beach Place, Los Angeles, California (Site), Heller, Ehrman, White & McAuliffe, LLP retained ENVIRON International Corporation (ENVIRON) to perform a screening Human Health Risk Assessment (HHRA) and presumptive feasibility study (FS) for the Site. A remedial investigation (RI) report for the Site was previously prepared by ENVIRON and submitted to DTSC on November 21, 2003.

The RI report for the Site found that volatile organic compounds (VOCs) are the main chemicals of potential concern (COPCs) at the Site based on their ubiquity and elevated concentrations. The predominant COPCs at the Site include tetrachlorethene (PCE), trichloroethene (TCE), and, to a lesser extent, their breakdown products.

ENVIRON conducted a screening HHRA to evaluate the reasonable potentially complete pathways and potentially exposed human receptors to COPCs at the Site. The results of the screening HHRA show that the estimated cancer risk from VOCs is $4 \times 10^{-3}$ for indoor commercial workers and $7 \times 10^{-5}$ for outdoor commercial workers. The major chemical contributors to the risk estimates are PCE, TCE, 1,1,2,2-tetrachloroethane, vinyl chloride, 1,1,2-trichloroethane, 1,2-dichloroethane, and benzene. Furthermore, the estimated noncancer hazard index (HI) for VOCs is 38 for indoor commercial workers and 0.4 for outdoor commercial workers. The major chemical contributors to the HIs are PCE and 1,2,4-trimethylbenzene. The results of the screening HHRA also show that the estimated cancer risks for semivolatile VOCs (SVOCs), pesticides, polynuclear aromatic hydrocarbons (PAHs), and metals are less than $1 \times 10^{-6}$ and the noncancer HIs are less than 1 for both the indoor and outdoor commercial workers. As part of the screening HHRA, risk-based target concentrations (RBTCs) were developed for all COPCs at the Site.

ENVIRON performed an evaluation and screening process in compliance with the National Contingency Plan (NCP), Title 40 of the Code of Federal Regulations (CFR), Part 300 (40 CFR 300). Because the soil at the Site is affected by VOCs, ENVIRON selected the presumptive remedy approach, in accordance with the United States Environmental Protection Agency (USEPA) guidance for conducting a presumptive FS under Comprehensive Environmental Response,

Compensation, and Liability Act (CERCLA) (USEPA, 1993b), and in general accordance with the USEPA guidance for conducting an FS under CERCLA (USEPA, 1988a). The presumptive FS was conducted to evaluate remedial alternatives responsive to the Site's Remedial Action Objectives, which include (1) reduction of human health risks; (2) reduction of risks to the environment; and (3) compliance with Applicable or Relevant and Appropriate Requirements (ARARs). The need for soil remediation at the Site was assessed based on potential risks to human health and the environment.

In accordance with USEPA guidance, four technologies and/or process options were selected for possible implementation at the Site. These technologies and process options were combined into alternatives for treatment of soil at the Site. A preliminary screening of the alternatives was performed based on effectiveness, implementability, and cost. Based on this screening, the following three alternatives were retained for further consideration using the NCP criteria: 1) Alternative 1: "No Action," retained as required by the USEPA (1993a); 2) Alternative 4a: *In situ* soil vapor extraction (SVE) combined with "hot spot" excavation and off-site disposal/recycling; and 3) Alternative 4b: *In situ* SVE combined with "hot spot" excavation and *ex situ* SVE. Of these three, Alternative 4b was considered as the most suitable remedial alternative for the Site.

Alternative 4b consists of a combination of *in situ* SVE and excavation and on-site *ex situ* SVE treatment. Soil in the portions of the Site affected by concentrations of VOCs exceeding RBTCs will be excavated, stockpiled on-site, and treated using a network of *ex situ* SVE pipes. The residual contaminated soils will be treated with an *in situ* SVE system. The extracted vapors from both the *in situ* and *ex situ* wells and pipes will be passed through a series of two granular activated carbon (GAC) vessels for removal of VOCs from the vapor phase. The vacuum pump for the *in situ* SVE system will be used to impart the necessary vacuum in the *ex situ* SVE system. It is anticipated that six to twelve months of remediation will be necessary to reduce soil concentrations to acceptable levels. This estimate is based on ENVIRON's previous experience with similar systems installed at similar sites. Upon completion of the remediation, ENVIRON will discuss with DTSC whether the treated stockpiled soil will be either spread on site, if approved and certified as "clean" by DTSC, or taken off-site for disposal as non-hazardous waste.

The total estimated cost for Alternative 4b is approximately $340,000, which includes approximately $230,000 for capital costs, $50,000 for annual operation and maintenance (O&M) charges, and $60,000 for post-remediation costs. This alternative, when implemented, will eliminate or reduce to acceptable levels the identified risks from the soil at the Site. Also, the alternative will provide for future redevelopment of the land for commercial/industrial use.

# 1.0 INTRODUCTION

## 1.1 Background

On behalf of the Respondents to the Consent Order issued by the California Environmental Protection Agency (Cal/EPA) Department of Toxic Substances Control (DTSC) on December 17, 2002 for the Davis Chemical Company site (Site; Figure 1), Heller, Ehrman, White & McAuliffe, LLP retained ENVIRON International Corporation (ENVIRON) to perform a supplemental remedial investigation (RI) at the Site. The results from the RI were presented in a separate report (ENVIRON, 2003) and are summarized below.

Based on ENVIRON's review of DTSC files and the Consent Order for the Site, as well as an interview with Ms. Diana Davis, a trustee of the Davis Family Trust, during a Site visit on February 19, 2003, ENVIRON concluded that either the Davis Chemical Company or the Davis Family Trust has owned the Site from approximately 1949 until the present. From 1949 until approximately November 1990, Davis Chemical operated as a recycler of spent solvents and transporter of waste solvents from various small manufacturing operations. The record also indicates that Betterbilt Chemicals (Betterbilt) operated at the Site from August 1, 1990 until October 23, 1990. Betterbilt's operations included fuel-blending activities and recovering acetone from waste polyester resins. Betterbilt also acted as a hazardous waste transporter.

In 1996, Smith-Emery conducted a soil investigation that consisted of advancing five borings to assess potential environmental impacts from the former acetone/lacquer-thinner recycling operations at the Site. The results of the investigation were documented in the report entitled "Report of Environmental Sampling, 1550 North Bonnie Beach Place, Los Angeles, California," dated November 12, 1996. Soil samples were analyzed for total petroleum hydrocarbons (TPH) as lacquer thinner, which was not found above the reporting limits (RLs) of 0.1 milligram per kilogram (mg/kg) in any of the soil samples analyzed by the laboratory. Based on the findings from its subsurface investigation, Smith-Emery recommended obtaining Site closure from DTSC.

ENVIRON conducted a supplemental RI for the Davis Site. The first phase of the supplemental RI included a soil gas survey on June 28, 2003, followed by the advancement of ten soil borings across the Site between July 1 and 3, 2003. The second phase of the supplemental RI, which involved the

advancement of six additional soil borings and the installation of three piezometers, took place between October 2 and 3, 2003.

From June through October 2003, ENVIRON collected soil gas samples at 6 locations and analyzed them for volatile organic compounds (VOCs), advanced 16 soil borings and sampled them to a maximum depth of 51 feet below ground surface (bgs), analyzed 69 soil samples for VOCs, and analyzed selected soil samples for polynuclear aromatic hydrocarbons (PAHs), semi-volatile organic compounds (SVOCs), organochlorine pesticides, polychlorinated biphenyls (PCBs), and metals.

Soil types observed by ENVIRON in the upper 50 feet of the subsurface under the Site included silty clays (from ground surface to a depth of approximately 7 feet bgs), underlain by a zone of silts and sandy silts with thinly interbedded sands (from a depth of approximately 7 feet bgs to a depth of approximately 30 feet bgs). These silts and sandy silts are underlain by a sequence of clays and silty clays with subordinate silts and minor sandy silts. The clays under the Site, where contiguous, act to attenuate the downward migration of chemicals. Further, the Site is located in a non-water-bearing highland area although shallow ground water has been observed at a depth of approximately 26 to 27 feet bgs in the three on-Site piezometers (ENVIRON, 2005).

Although present at discernible concentrations, PAHs, SVOCs, pesticides, and PCBs appear to be of no or minor importance at the Site. Similarly detected metals concentrations are typical of state background concentrations. VOCs are the main chemicals of potential concern (COPCs) at the Site based on their ubiquity and elevated concentrations. The most predominant COPCs at the Site are tetrachlorethene (PCE), trichloroethene (TCE), and, to a lesser extent, their breakdown products.

Elevated concentrations of acetone were reported for soil samples from the boring that was advanced near the former acetone/thinner aboveground feed tank location (i.e., Boring SB3; see Figure 2). In this boring, the elevated acetone concentrations were confined to the upper 15 feet of the soil. The highest reported concentration of acetone, 279,000 micrograms pre kilogram (µg/kg), was more than an order of magnitude lower than the preliminary remediation goal (PRG) of 6,000,000 µg/kg for acetone in soil for the industrial site scenario.

The highest concentrations of PCE at 221,000 µg/kg and TCE at 15,200 µg/kg were reported for soil samples collected from two soil borings advanced at the eastern corner of the Site near the area where fluid was observed to be flowing onto the Site from the neighboring uphill property located to the south-southeast. These concentrations are significantly higher than the PRGs of 3,400 µg/kg and 110 µg/kg for PCE and TCE in soil for the industrial site scenario, respectively. ENVIRON believes that the industrial activities conducted at the uphill property may have caused, or at the least contributed to, the reported elevated concentrations of PCE and TCE at this area of the Site.

Based on the RI findings, ENVIRON conducted a screening human health risk assessment (HHRA), as described in Section 2.0. The HHRA identified 1,2,4-trimethylbenzene as the second largest contributor to noncancer hazard index (HI), the primary contributor being PCE. Direct contact with liquid 1,2,4-trimethylbenzene is irritating to the skin and breathing the vapor is irritating to the respiratory tract causing pneumonitis. Breathing high concentrations of the chemical vapor causes headache, fatigue, and drowsiness. Production of 1,2,4-trimethylbenzene occurs during petroleum refining as a major component of the C9 aromatic hydrocarbon fraction (or simply the C9 fraction). It typically constitutes around 40 percent of the C9 fraction with other trimethyl-benzenes and ethyltoluenes making up the remainder of this fraction. The primary use of the C9 fraction, approximately 99% of its production volume, is as a gasoline additive. Volatilization is the major route of removal of 1,2,4-trimethylbenzene from soil; although, biodegradation may also occur (USEPA, 1994). Given the automobile repair activities conducted on the neighboring uphill property, there is a potential that the source of 1,2,4-trimethylbenzene at the Site is the neighboring uphill property.

The feasibility study (FS) conducted by ENVIRON, using the results of the RI and HHRA, was a presumptive FS. A presumptive FS, as discussed in sections 1.2 through 1.4, is intended to accelerate the FS process at a site.

## 1.2 Introduction to the Presumptive Remedy Approach

The presumptive remedy approach prescribes the most appropriate remedial alternatives for specific categories of sites contaminated with specific types of chemicals (United States Environmental Protection Agency (USEPA), 1993b). The USEPA (1996a) defines presumptive remedies as:

> "Preferred technologies for common categories of sites, based on historical patterns of remedy selection and EPA's scientific and engineering evaluation of performance data on technology implementation."

The USEPA (1993a) has conducted a detailed review of technologies for most of the presumptive remedies site categories and has determined that certain technologies are routinely omitted from consideration on the basis of their effectiveness, implementability, and cost or have not been selected under the nine criteria analysis identified in National Contingency Plan (NCP) Section 300.430 (e) (9). See Section 4.6. On the other hand, certain technologies have been routinely utilized to remediate specific categories of sites contaminated with specific types of chemicals.

Based on these efforts, the USEPA has issued presumptive remedies for the following five types of sites:

- Contaminated Ground Water
- Municipal Landfills
- Metals in Soils
- VOCs in soils
- Wood Treaters

The idea behind the presumptive remedy approach is that it should accelerate most phases of an RI/FS investigation by focusing the efforts on technologies that, in the past, have proven to be effective for a given contamination scenario. If a site qualifies under the presumptive remedy approach, then the FS study will be limited in its considerations to the no action alternative and the presumptive remedy technologies (USEPA, 1993a).

## 1.3 Determination to Use the Presumptive Remedy Approach

The USEPA has described a presumptive remedy process for soils contaminated with VOCs, which includes steps used to identify sites and contamination scenarios that may be amenable to the presumptive remedy approach (USEPA, 1993b). The first step in this process is to determine whether VOCs are the major contaminant class present at the site. Also, if VOCs are present at levels of concern based on a HHRA, then a presumptive remedy approach may be applicable to the site. The majority of contaminants found at the Site are VOCs (see Section 3.0 for details). Furthermore, as discussed in the HHRA (Section 2.0), VOCs account for greater than 95 percent of the health and environmental risks at the Site.

The next step in the process requires the identification of non-VOCs contaminants that may potentially affect remedial strategies chosen to target VOCs in soils. ENVIRON has determined that, in addition to VOCs, other chemicals do exist at the Site. As previously indicated, these chemicals include SVOCs, PAHs, pesticides, metals, and petroleum hydrocarbons. While present at discernable concentrations, most compounds in these classes of chemicals are at relatively low concentrations (considerably below established PRGs) and do not pose a significant health or environmental threat. Moreover, they should not interfere with the remedial strategies prescribed for the removal of VOCs from soils.

The rest of the screening for the presumptive remedial process is concerned with selecting the appropriate presumptive remedy for the given site and ensuring that stakeholders are aware of the prescribed approach.

Given these observations and the site-specific chemical and geological data at the Site, ENVIRON believes that a presumptive remedial approach is appropriate for the Site.

### 1.4 Presumptive Feasibility Study Objectives and Approach

The objectives of this presumptive FS were to evaluate presumptive remedial technologies for addressing the affected media at the Site and process options for the implementation of those technologies. The affected media at the Site are soils. ENVIRON performed an evaluation and screening process in compliance with the NCP Title 40 of the Code of Federal Regulations (CFR), Part 300 (40 CFR 300). The guidance prepared by the USEPA for performing a presumptive FS under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA; USEPA, 1993b) were followed in addition to guidance for performing an FS under CERCLA (USEPA, 1988a). The ground water was encountered at the Site and was considered not to require immediate investigation and is not addressed in this presumptive FS.

The approach used in this presumptive FS consisted of several steps. First, presumptive remedial action objectives and Applicable or Relevant and Appropriate Requirements (ARARs) were defined for the Site. Then, affected media at the Site and their approximate extents were defined. This was followed by considering various technologies and their associated process options for addressing the wastes at the Site under the presumptive remedial approach. Next, the process options were screened based on their effectiveness, implementability, and relative cost. A detailed evaluation of these remedial alternatives was performed using the nine criteria required by the NCP. Finally, based on a comparative analysis of the remedial alternatives, a preferred alternative was recommended for the Site.

### 1.5 Report Organization

The remainder of this report is divided into the following sections:

- Section 2.0: Screening of Human Health Risk Assessment
- Section 3.0: Remedial Action Objectives and ARARs
- Section 4.0: Detailed Analysis of the No Action and the Presumptive Remedy Alternatives
- Section 5.0: Preferred Alternative for the Site
- Section 6.0: References
- Section 7.0: Limitations

# 2.0 SCREENING HUMAN HEALTH RISK ASSESSMENT

## 2.1 Introduction

### 2.1.1 Overview

This section presents the screening human health risk assessment (screening HHRA) conducted for the Site. This screening HHRA evaluates reasonable potentially complete pathways and potentially exposed human receptors at the Site. The results of the screening HHRA will be used to identify areas of concern at the Site and to support remedial decisions recommended in the presumptive FS. This risk assessment is based on continued commercial use of the Site. If the land use should change, this risk assessment may need to be re-evaluated.

The methodology used in this assessment is consistent with the following Cal/EPA and USEPA risk assessment guidance:

- *Supplemental Guidance for Human Health Multimedia Risk Assessments of Hazardous Waste Sites and Permitted Facilities* (Cal/EPA, 1992);
- *Preliminary Endangerment Assessment Guidance Manual* (Cal/EPA, 1994);
- *Risk Assessment Guidance for Superfund. Volume I – Human Health Evaluation Manual (Part A,* USEPA, 1989);
- *Risk Assessment Guidance for Superfund. Volume I – Human Health Evaluation Manual (Part B, Development of Risk-Based Preliminary Remediation Goals,* USEPA, 1991a);
- *Risk Assessment Guidance for Superfund. Volume I: Human Health Evaluation Manual. Supplemental Guidance: "Standard Default Exposure Factors"* (USEPA, 1991b);
- *Exposure Factors Handbook* (USEPA, 1997a); and
- *Draft Guidance for Evaluating the Vapor Intrusion to Indoor Air Pathway from Groundwater and Soils* (Subsurface Vapor Intrusion Guidance, USEPA, 2002a).

### 2.1.2 Organization

This risk assessment section is divided into nine subsections as follows:

- Section 2.1 – Introduction: describes the purpose and scope of the risk assessment and outlines the organization of this section of the report.
- Section 2.2 – Selection of Chemicals of Potential Concern: identifies the chemicals selected for quantitative evaluation in the risk assessment.
- Section 2.3 – Identification of Populations and Exposure Pathways: discusses potentially complete exposure pathways and exposed human populations to be included in the quantitative risk assessment.
- Section 2.4 – Exposure Assessment: estimates the magnitude of the actual or potential human exposures. The results of the exposure assessment are pathway-specific and receptor-specific estimates of intakes.
- Section 2.5 – Estimates of Chemical Migration by Volatilization: discusses the methodology used to evaluate the fate and transport of chemical among environmental media.
- Section 2.6 – Toxicity Assessment: identifies the toxicity values for the chemicals evaluated and describes the potential health effects.
- Section 2.7 – Risk Characterization: combines and analyzes results of the exposure and toxicity assessment in order to characterize the potential for adverse health effects to occur as result of exposure to Site-related chemicals. This subsection also includes the development of risk-based target concentrations (RBTCs).
- Section 2.8 – Uncertainties: discusses the inherent uncertainties and limitations associated with the assumptions and calculations used in the risk assessment. The approach used in this assessment has been designed to be health-protective.
- Section 2.9 – Summary/Conclusions: summarizes the results of the risk assessment and presents conclusions regarding the potential for adverse health risks due to exposure to Site-related chemicals.

## 2.2 Selection of Chemicals of Potential Concern

The purpose of this subsection is to identify those chemicals that will be quantitatively evaluated in this screening HHRA. This selection of chemicals was developed based upon the analytical results from the RI Report (ENVIRON, 2003).

As discussed in the RI, eight VOCs were detected in soil gas samples collected on-site. The following chemicals were detected in on-site soils: ten metals, seven pesticides, two SVOCs, three

PAHs and 37 VOCs. The total number of chemicals detected on-site in soil gas and/or soil is 59 (summarized in Table 2.1).

For the purposes of this screening HHRA, all detected chemicals are considered COPCs and are further evaluated.

## 2.3 Identification of Populations, Exposure Pathways, and Conceptual Site Model

Once the potentially exposed populations are identified, the complete exposure pathways by which individuals may contact chemicals present in the soil and soil gas at a site are determined. An exposure pathway is defined as "the course a chemical or pollutant takes from the source to the organism exposed" (USEPA, 1988b). An exposure route is "the way a chemical or pollutant enters an organism after contact" (USEPA, 1988b). A complete exposure pathway requires the following four key elements:

- On-site chemical source;
- Migration route (i.e., environmental transport);
- An exposure point for contact (e.g., air); and
- Human exposure route (e.g., inhalation).

An exposure pathway is not complete unless all four elements are present.

A conceptual site model (CSM) for potential exposure pathways is used to show the relationship between a chemical source, exposure pathway, and potential receptor at a site. The CSM identifies all potential or suspected chemical sources, potentially impacted media, and potential receptors. It also identifies the potential human exposure routes for contacting impacted media. These source-pathway-receptor relationships provide the basis for the quantitative exposure assessment. In fact, only those complete source-pathway-receptor relationships are included in the quantitative risk evaluation.

The CSM for the Site is shown in Figure 3. Section 2.3.1 discusses the potentially exposed populations and Section 2.3.2 discusses the potentially complete exposure pathways.

### 2.3.1 Potentially Exposed Populations

The Site is located in a generally commercial/light industrial area of East Los Angeles. The immediate vicinity of the Site consists generally of light industrial/automotive facilities with the exception of a residence located on an adjacent property uphill and to the south-southwest of the Site; this property also appears to support industrial activities in the back portion of the property. North Bonnie Beach Place runs adjacent to the southwestern boundary of the Site.

Across the street are more light industrial facilities, while further uphill there are several residences.

The Site is currently vacant and no operations appear to be conducted. A rectangular shed, containing office space, is built into the concrete retaining wall located along the southwestern boundary of the Site parallel to North Bonnie Beach Place. There is also a storage container located on the southeastern portion of the Site. The remainder of the Site is vacant with the western portion covered by concrete slabs, in the middle of which is a small raised brick platform. The northeastern portion of the Site is unpaved and currently covered with vegetation. In the future, the Site land use is expected to remain commercial/industrial.

As discussed above, there are no current on-site workers. Current populations of concern would be on-site trespassers. As the Site is expected to remain commercial/industrial, future on-site populations will include on-site workers and visitors. Future on-site workers are expected to be on-site with greater frequency and duration than trespassers or visitors and, therefore are considered the maximum exposed population. Only the future on-site worker is evaluated in this screening HHRA. Any health risks to trespassers or visitors would be lower than those estimated for on-site workers.

### 2.3.2 Relevant Exposure Pathways

Exposure pathways were considered potentially complete if one of two conditions were met. First, if existing information indicated that exposures could be reasonably expected to occur (e.g., direct exposure to surface soil) and second, if additional information or interpretation was required in order to assess whether a significant exposure is occurring or would occur (e.g., soil gas migration to indoor or ambient air).

Future on-site workers could be directly exposed to chemicals remaining in surface soils at the Site. Potential routes of exposure would include incidental ingestion, dermal contact, and inhalation of volatile chemicals and windblown particulates.

Because no direct contact is likely to occur with subsurface soils, exposures to chemicals in subsurface soil is limited to the inhalation of VOCs that have migrated through the overlying soil into indoor and ambient air. Currently, there are no structures built over the area of the investigation. However, this assessment assumes that a building can be built anywhere on the Site in the future. Therefore, the potential exposures resulting from the inhalation of subsurface soil vapors that have migrated through the soil column will be quantified in this risk assessment for on-site workers.

For screening purposes, both a full-time indoor and outdoor commercial worker is evaluated. This is more conservative than assuming an individual spends a fraction of their time in each environment. The following exposure routes are evaluated for each population:

Indoor Commercial Worker:

- Migration of VOCs into indoor air,
- Inhalation of windblown particulates,
- Incidental ingestion of soil, and
- Dermal contact with soil.

Outdoor Commercial Worker:

- Migration of VOCs into outdoor air,
- Inhalation of windblown particulates,
- Incidental ingestion of soil, and
- Dermal contact with soil.

## 2.4 Exposure Assessment

The purpose of this subsection is to develop an upper-bound estimate of the theoretical intake for each of the potentially exposed human populations via each of the exposure routes identified in the CSM. Estimates of human intake are a function of exposure parameters such as duration, frequency, and contact rates. This section provides the equations and assumptions used to develop the intake factors used in the calculation of risks.

### 2.4.1 Estimation of Intake

The USEPA (1989) defines exposure as "the contact with a chemical or physical agent" and defines the magnitude of exposure as "the amount of an agent available at human exchange boundaries (i.e., lungs, gut, skin) during a specified time." Exposure assessments are designed to determine the degree of contact a person has with a chemical. This section presents the equations used to estimate chemical exposures or intakes. These estimates of intake will be combined with toxicity values (Section 2.6) to estimate risks for each receptor of concern (Section 2.7).

The chemical intake equation includes variables that characterize the contact rate, exposure time, exposure frequency, exposure duration, body weight, and exposure averaging time. The intake can be calculated using the following generalized equation:

$$I = \frac{C \times CR \times ET \times EF \times ED}{BW \times AT}$$

Where:

| | | |
|---|---|---|
| I | = | Intake of a chemical (mg chemical/kg bodyweight-day) |
| C | = | Chemical concentration (e.g., mg chemical/cubic meter [$m^3$]air) |
| CR | = | Contact Rate; the amount of medium contacted per unit time (e.g., $m^3$ air/hour) |
| ET | = | Exposure Time (hours/day) |
| EF | = | Exposure Frequency (days/year) |
| ED | = | Exposure Duration (years) |
| BW | = | Body Weight (kg) |
| AT | = | Averaging Time; period over which exposure is averaged (days) |

Tables 2.2 through 2.5 present the route-specific equations used in this screening HHRA. The equations for exposure via inhalation of vapors is presented in Table 2.2, inhalation of windblown soil particulates in Table 2.3, incidental ingestion of soil in Table 2.4, and dermal contact with soil in Table 2.5. Exposure assumptions used to estimate intake for the potential populations of concern are summarized in Table 2.6 and discussed below.

### 2.4.2 Exposure Assumptions

Assumptions for route-specific exposure parameters used to estimate intakes can be separated into the following three categories:

- Assumptions regarding human physiology (e.g., body weight and skin surface area);
- Assumptions specific to the potentially exposed population (e.g., years in which an individual resides, works, or recreates at the same location); and
- Assumptions specific to the given route of exposure (e.g., amount of water contacted each day).

For this risk assessment, exposure assumptions corresponding to a reasonable maximum exposure (RME) scenario were developed. Intake assumptions for the RME scenario represent "the highest exposure that is reasonably expected to occur at the site" (USEPA, 1989). According to the USEPA, the intent of the RME scenario is "to estimate a conservative exposure case (i.e., well above the average case) that is still within the range of possible exposures" (USEPA, 1989). The RME is estimated by combining "upper-bound and mid-

range exposure factors so that the results represent an exposure scenario that is both protective and reasonable; not the worst possible case" (USEPA 1989).

Where available and appropriate, exposure parameter values recommended by the Cal/EPA (1992 and 1994) and USEPA (1989, 1991b, 1997a) were used. The three categories of exposure assumptions are further discussed below.

#### 2.4.2.1 Human Physiological Assumptions

For estimating potential exposures to the future on-site workers, the physiological assumptions for a male adult have been used as recommended by Cal/EPA (1992) and USEPA (1991b). The physiological assumptions used in this assessment include an adult body weight of 70 kg.

For the future on-site workers, the RME breathing rate is 2.5 $m^3$/hour or 20 $m^3$/work-day (Cal/EPA, 1992; USEPA, 1991b).

#### 2.4.2.2 Population-Specific Assumptions

Assumptions regarding population-specific exposure frequency, exposure duration, and exposure averaging time are used to determine the pathway-specific chemical intakes for the potentially exposed populations. Exposure frequency and exposure duration determine the total time of exposure for each population.

For the future on-site worker, it is assumed that exposure occurs for eight hours/day, 250 days/year (Cal/EPA, 1992; USEPA, 1991). The duration of exposure is assumed to be 25 years (Cal/EPA, 1992; USEPA, 1991).

The averaging time selected for estimating chemical intake for a particular exposed population depends on the type of effect being assessed. In accordance with regulatory guidance (USEPA 1989 and 1991b), intakes for carcinogens are calculated by averaging the dose received during the exposure period over a lifetime (i.e., 70 years or 25,550 days). As indicated in regulatory guidance for noncarcinogens, the averaging time used is the period of exposure expressed in days. The basis for the use of different averaging times for carcinogens and noncarcinogens is related to the currently held scientific opinion that the two categories of chemicals have different mechanisms of action.

#### 2.4.2.3 Route-Specific Assumptions

Exposures to future on-site workers may potentially occur from inhalation of soil gas vapors. In addition, exposures to future on-site workers may potentially include

incidental ingestion of soil, dermal contact with soil and inhalation of windblown dust from soil. The route-specific assumptions used to characterize the intake for these exposure pathways are presented below.

It is assumed that workers may be exposed to VOCs remaining in soil and windblown particulates via the inhalation route. Breathing rates for this route of exposure were previously discussed in Section 2.4.2.1 above.

ENVIRON assumed that workers may be exposed to airborne particulates on a daily basis under regular Site conditions. Based on USEPA soil screening guidelines (USEPA, 1996b), a particulate emission factor (PEF) of 1.316 x $10^9$ $m^3/kg$ was used to estimate airborne concentrations of a chemical from corresponding soil concentrations. This PEF is based on the USEPA default dispersion coefficient (Q/C) for the Los Angeles area (USEPA, 1996b) and reflects an airborne concentration of dust of approximately 1 $\mu g/m^3$. The inverse of the PEF, listed as the transfer factor in Table 2.6, is 1.0 x $10^{-9}$ ($kg/m^3$). As part of the estimation of the potential exposure via inhalation of dust, it is assumed that the inhaled dust has the same chemical composition as the surface soil at the Site. This is a conservative assumption because not all of the dust in the air at the Site will have originated from the Site.

Incidental ingestion of soil and dust is highly dependent on the type of work being performed and the age of the receptor. For a commercial/industrial worker, the recommended soil ingestion rate is 50 mg/day (Cal/EPA, 1992)

Exposure via dermal contact may result from the deposition of soil particles onto skin and the subsequent absorption of chemicals present in the deposited soil through the skin. For workers, the recommended exposed surface area of 5,700 square centimeters ($cm^2$) assumes exposure via head, hands, and forearms (Cal/EPA, 2000). The assumed dermal adherence factor is 0.2 for a commercial worker. This value is recommended by Cal/EPA (2000) and USEPA (2001) to represent an average dermal adherence over all exposed skin. The chemical-specific absorption factors for soil are listed in Table 2.7.

### 2.4.3 Quantification of Exposure

The intake factors are presented in Table 2.8 for both carcinogenic and noncarcinogenic effects. The intake factors presented in the tables employ the equations given in Tables 2.2 through 2.5 and the exposure assumptions in Table 2.6, without the chemical specific concentrations/absorption factors and transfer factors. The soil gas-to-air and soil-to-air transfer factors are discussed in Section 2.5.

## 2.5 Estimates of Chemical Migration by Volatilization

This subsection describes the approach used to estimate intermedia transfer factors needed to evaluate the risk from inhalation pathways. Chemicals detected in soil can potentially migrate in a vapor phase through the unsaturated zone to indoor or ambient air. This migration is quantified for the purposes of risk assessment through an intermedia transfer factor. This transfer factor is defined so that when it is multiplied by the source concentration of a chemical in soil gas or soil, the product is the resulting steady-state concentration that is predicted in indoor or ambient air.

Intermedia transfer factors for the exposure scenarios will be estimated using the screening-level model of vapor migration described by Johnson and Ettinger (1991). Specifically, Version 3.0 of the spreadsheet developed by the USEPA (2003) for soil-to-indoor air was used. Also, though the spreadsheet is designed for evaluating soil as a source, it also provides intermediate results that allow evaluation of a soil gas.

The Johnson and Ettinger model and its variants couple the following fate and transport processes:

- Source zone partitioning to determine source vapor concentration;
- Transport across the vadose zone by diffusion;
- Transport by diffusion and advection across the soil surface and, if present, a surface barrier such as asphalt or building foundation; and
- Dispersion in indoor air assuming uniform mixing in a building or in ambient air using regional dispersion factors.

The first process in the above list, source zone partitioning, determines the vapor concentration of the chemical at the soil source. The last three processes, when considered together, describe the attenuation of the source soil vapor concentration as it migrates to indoor air. In the context of the Johnson and Ettinger model, the combined effect of these three attenuation processes is typically referred to as a, the soil vapor attenuation coefficient. Intermedia transfer factors, as used in this risk assessment, include the effect of source zone partitioning as well as the three attenuation processes. Therefore, the transfer factor for soil is simply the product of the appropriate partition coefficient and the vapor attenuation coefficient. Because soil gas data include the partitioning effect, the transfer factor for soil gas is the soil vapor attenuation coefficient (a).

The calculation of transfer factors is based on parameters describing the properties of the COPCs, the vadose zone, the surface barrier, and the air dispersion zone. The physical-chemical properties for the COPCs are shown in Table 2.9. Based on guidance from USEPA (1991a), only COPCs that easily volatilize are included in the evaluation of indoor and ambient air. These include chemicals with a Henry's Law constant of greater than $1 \times 10^{-5}$ atmosphere-cubic meter per mole (atm-$m^3$/mol)

and a molecular weight of less than 200 grams [g]/mole.

Vadose zone soil parameters, including soil bulk density, porosity, and water-filled porosity, which are used to calculate the effective diffusion coefficients used in the model, are shown in Table 2.10. These parameters are defined based on soil physical property measurements taken from Sample SB7-2.0-2.5 collected at a depth of 2.0 to 2.5 feet bgs. This is the shallowest sample and the only sample in the depth interval between the top of the soil gas detections and the ground surface. Though some deeper measurements were also available, the physical properties from shallower soils were considered more representative for the purposes of predicting exposures to soil gas. The sandy soil type is used to calculate vapor permeability for advection across the building foundation because guidance states that coarse-grained soil or disturbed fine-grain soil is often found within the foundation (USEPA, 2002a). This soil type and the shallow soil properties are used in the modeling of all transfer factors for this screening HHRA.

With these constant soil parameters, there are two different exposure scenarios to be considered:

- Migration into indoor air in a commercial building, and
- Migration into outdoor air.

In each case, the source of chemical migration is considered to be either soil gas or soil. Soil gas concentration data are considered more representative for the purposes of assessing exposures related to vapor migration. Soil data are not recommended by the USEPA in their recent guidance for evaluating vapor migration when data from soil gas are available (USEPA, 2002a). However, soil gas data are not available for all COPCs or all areas at the Site, so it was necessary to calculate transfer factors from soil contamination.

The inputs associated with the above two exposure scenarios are described below.

### 2.5.1 Migration into Buildings

The factors that determine migration into buildings include the underlying soil properties (described above), depth to soil and soil gas contamination, foundation structure, pressure drop across the foundation, air exchange rate, and dimensions of the building. Table 2.10 presents the characteristics used for a default future commercial building. This default building is used for the purposes of evaluating a conservative hypothetical building in the future.

The foundation characteristics, pressure drops, and air exchange rates used for the building are conservative default parameters. Soil contamination is assumed to occur from the surface to a depth of 40.5 feet bgs, which is the interval of COPC detections in soil. Vapor migration from

soil gas is evaluated for soil gas at 5 feet bgs, the shallowest depth of soil gas measurements. The transfer coefficient for shallower soil gas is always higher and, hence, more conservative.

Resulting soil gas- and soil-to-indoor air transfer factors are shown in Tables 2.11 and 2.12, respectively.

### 2.5.2 Migration into Outdoor Air

Migration from soil gas and soil to ambient air is estimated using a conceptual model similar to the indoor air model but with three main differences. First, there is no barrier to vapor flux at the ground surface because the ground is considered to be bare. Second, convective transport at the surface is assumed to be negligible since the effect of any natural fluctuations in atmospheric pressure will be small over the long term. Third, dilution of vapors migrating through the ground surface is calculated based on a region specific meteorologic dispersion factor (i.e., the inverse of mean concentration at center of a square source (Q/C; g per square meter-second ($g/m^2$-s) per $kg/m^3$) recommended by USEPA (1996b).

The value for Q/C is 68.81 $g/m^2$-s per $kg/m^3$. This is the value for a 0.5-acre source in Los Angeles (USEPA, 1996b). Diffusive flux is divided by Q/C in order to calculate ambient air transfer factors.

Resulting soil gas- and soil-to-outdoor air transfer factors are shown in Tables 2.11 and 2.12, respectively

## 2.6 Toxicity Assessment

The purpose of the toxicity assessment is to present the weight-of-evidence regarding the potential for a chemical to cause adverse effects in exposed individuals, and to characterize quantitatively, where possible, the relationship between exposure to a chemical and the increased likelihood and/or severity of adverse effects (i.e., the dose-response assessment). Well conducted epidemiological studies that show a positive association between exposure to a chemical and a specific health effect are the most convincing evidence for predicting potential hazards for humans. However, human data that would be adequate to serve as the basis for the dose-response assessment are available for only a few chemicals. In most cases, toxicity assessment for a chemical has to rely on information derived from experiments conducted on non-human mammals, such as the rat, mouse, rabbit, guinea pig, hamster, dog, or monkey.

When the dose-response assessment is based on animal studies, it usually requires two types of extrapolation: high-to-low dose extrapolation and interspecies extrapolation. High-to-low dose extrapolation involves predicting the incidence rate of an adverse effect at low exposure levels

based on the results obtained at high exposure levels. Interspecies extrapolation involves predicting the likelihood of an adverse effect in humans based on results obtained from animal studies. In the absence of evidence to the contrary, it is assumed that adverse effects observed in animals also will occur in humans.

Chemicals are usually evaluated for their potential health effects in two categories, carcinogenic and noncarcinogenic. Different methods are used to estimate the potential for carcinogenic and noncarcinogenic health effects to occur. All chemicals produce noncarcinogenic effects at sufficiently high doses but only some chemicals are associated with carcinogenic effects. Most regulatory agencies consider carcinogens to pose a risk for cancer at all exposure levels (i.e., a "no-threshold" assumption); that is, any increase in dose is associated with an increase in the probability of developing cancer. In contrast, noncarcinogens generally are thought to produce adverse health effects only when some minimum exposure level is reached (i.e., a threshold dose).

Sections 2.6.1 and 2.6.2 describe the methods used for the chronic toxicity assessment of carcinogens and noncarcinogens, respectively. Section 2.6.3 identifies the hierarchy of sources used to select toxicity values for this assessment.

### 2.6.1 Carcinogenic Effects

Current health risk assessment practice for carcinogens is based on the assumption that there is no threshold dose below which carcinogenic effects do not occur. This current "no-threshold" assumption for carcinogenic effects is based on an assumption that the carcinogenic processes are the same at high and low doses. This approach has generally been adopted by regulatory agencies as a conservative practice to protect public health. The "no-threshold" assumption is used in this risk assessment for evaluating carcinogenic effects. Although the magnitude of the risk declines with decreasing exposure, the risk is believed to be zero only at zero exposure.

There are two components to the assessment of the carcinogenic effects of a chemical: a qualitative determination of the likelihood of it being a human carcinogen (i.e., weight-of-evidence), and a quantitative assessment of the relationship between exposure dose and response (i.e., cancer slope factor). Using the weight-of-evidence approach, the USEPA's Carcinogen Assessment Group (CAG) categorizes chemicals into Groups A, B, C, D, and E carcinogens (USEPA, 1989). CAG's classification of carcinogens is briefly described below:

- Group A – Human Carcinogen
  *This category indicates that there is sufficient evidence available from human*

*epidemiological studies to support a causal association between exposure to the chemical and the development of human cancer.*

- Group B – Probable Human Carcinogen
  *This category indicates that sufficient evidence exists from animal studies to support a causal relationship between exposure to the chemical and the development of cancer in animals. This category is divided into subgroups B1 and B2. Group B1 chemicals also have limited evidence for carcinogenicity from human epidemiological studies. Group B2 chemicals have inadequate or no evidence from epidemiological studies.*
- Group C – Possible Human Carcinogen
  *This category is for chemicals that exhibit limited evidence of carcinogenicity in animals.*
- Group D – Not Classifiable as to Human Carcinogenicity
  *This category is used for chemicals with inadequate human and animal evidence of carcinogenicity.*
- Group E – Evidence of Noncarcinogenicity for Humans
  *This category is used for chemicals that show no evidence of carcinogenicity in at least two adequate animal tests in different species or in both adequate epidemiological and animal studies.*

Cancer slope factors (CSFs) are used to quantify the response potency of a potential carcinogen. CSFs are typically calculated for carcinogens in Group A, B1, and B2. The USEPA decides to derive CSFs for Group C chemicals on a case-by-case basis.

CSFs may be based on either human epidemiological or animal data and are calculated by applying a mathematical model to extrapolate from responses observed at relatively high exposure doses in the studies to responses expected at lower doses of human exposure to environmental contaminants. A number of mathematical models and procedures have been developed for the extrapolation. In the absence of adequate data to the contrary, the linearized multistage model is employed (USEPA, 1989).

In general, the CSF is a plausible upper-bound estimate of the probability of a response per unit intake of a chemical, e.g., $(mg/kg/day)^{-1}$, over a lifetime. The CSF is used in risk assessments to estimate an upper-bound lifetime probability of an individual developing cancer as a result of exposure to a particular level of a potential carcinogen. The true value of the risk is unknown, and may be as low as zero.

### 2.6.2 Noncarcinogenic Effects

The dose-response assessment for noncarcinogenic effects requires the derivation of an exposure level below which no adverse health effects in humans are expected to occur. These levels are referred to as reference doses (RfDs) for oral exposure and reference concentrations (RfCs) for inhalation exposure (USEPA, 1989). For the characterization of the potential noncarcinogenic health effects, inhalation RfCs, which are generally reported as concentrations in air, are converted to corresponding inhaled doses (inhalation RfDs) using USEPA-approved interim methodology (USEPA, 1989).

### 2.6.3 Sources of Toxicity Values

The hierarchy of sources used for the toxicity factors is consistent with those recommended by the DTSC for risk assessments. This hierarchy is as follows:

- Cal/EPA CSFs, RfDs, and RfCs (Cal/EPA, 2003a and 2003b);
- CSFs, RfDs, and RfCs developed by the USEPA and listed in the Integrated Risk Information Service (IRIS) (USEPA, 2004);
- USEPA CSFs, RfDs, and RfCs listed in the USEPA Health Effects Assessment Summary Tables (HEAST) (USEPA, 1997b); and
- Provisional USEPA RfDs and RfCs recommended by USEPA's National Center for Environmental Assessment (NCEA).

Cancer and noncancer toxicity values used in this assessment are summarized in Tables 2.13 and 2.14, respectively. Where available, the table also presents the classification of carcinogens according to the weight-of-evidence. Specific dermal route CSFs and RfDs have not yet been developed for any chemicals. Consistent with USEPA and Cal/EPA risk assessment guidance, potential health effects associated with dermal exposure are calculated using the oral toxicity factors.

## 2.7 Risk Characterization

Risk characterization is the final step of the risk assessment. It is defined as the combination of the exposure assessment and toxicity assessment to produce an estimate of cancer risk and noncancer hazard, along with a characterization of uncertainties in the estimated risk. This section presents the results of the risk assessment for the Site. In Section 2.7.1, the methods for estimating cancer risks and noncancer hazard indices (HIs) are discussed. Section 2.7.2 presents the estimated cancer risks and chronic noncancer HIs for the future on-site workers. Section 2.7.3 presents the RBTCs for Site soils.

### 2.7.1 Methodology

Estimating cancer risks and noncancer HIs requires information regarding the level of intake of the chemical and the relationship between intake of the chemical and its toxicity as a function of human exposure to the chemical. The methodology used to derive the cancer risks and noncancer HIs for the selected chemicals is based on guidance provided by USEPA (1989).

The potential risk associated with a chemical in all media can be estimated using equations that describe the relationships among the estimated intake of site-related chemicals, toxicity of the specific chemicals, and overall risk for carcinogenic and noncarcinogenic health effects.

For carcinogenic effects, the relationship is given by the following equation (USEPA, 1989):

$$\text{Risk} = I \times CSF$$

Where:

| | | |
|---|---|---|
| Risk | = | Cancer Risk; the incremental probability of an individual developing cancer as a result of exposure to a particular cumulative dose of a potential carcinogen (unitless) |
| I | = | Intake of a chemical (mg chemical/kg body weight-day) |
| CSF | = | Cancer Slope Factor (mg chemical/kg body weight-day)-1 |

The relationship for noncarcinogenic effects is given by the following equation (USEPA, 1989):

$$HQ = \frac{I}{RfD}$$

Where:

| | | |
|---|---|---|
| HQ | = | Hazard Quotient; an expression of the potential for noncarcinogenic effects, which relates the allowable amount of a chemical (RfD) to the estimated site-specific intake (unitless) |
| I | = | Intake of chemical (mg chemical/kg body weight-day) |
| RfD | = | Reference Dose; the toxicity value indicating the threshold amount of chemical contacted below which no adverse health effects are expected (mg chemical/kg body weight-day). |

The HI is the sum of more than one hazard quotient for multiple substances and/or multiple exposure pathways.

The NCP is commonly cited as the basis for acceptable incremental risk levels. According to the NCP, lifetime incremental cancer risks posed by a site should not exceed one hundred in a million ($1 \times 10^{-4}$) to one in a million ($1 \times 10^{-6}$). For noncancer health hazards, a target HI of one is identified. As a risk management policy, the Cal/EPA generally considers $1 \times 10^{-6}$ to be a point of departure for purposes of making risk management decisions, with most approved remediations achieving incremental risk levels of ten in one million ($1 \times 10^{-5}$) or lower. The California Safe Drinking Water and Toxic Enforcement Act ("Proposition 65") considers $1 \times 10^{-5}$ as a no significant risk level.

Individual chemical exposures that yield HIs of greater than one may be of concern for noncancer health effects (USEPA, 1989). Hazard indices for individual chemicals may be segregated based on target organ (e.g., liver, kidney, respiratory system), thus a cumulative HI for all chemicals that is greater than one may still indicate a safe exposure.

### 2.7.2 Estimated Cancer Risks and Noncancer Hazard Indices

As a first screening step, all cancer risks and noncancer HIs were calculated using the maximum concentration detected in each medium. A summary of these screening cancer risks and noncancer HIs are presented in Tables 2.15 through 2.20 and is discussed below.

Estimated cancer risks are expressed using scientific notation (e.g., $1 \times 10^{-6}$) and estimated HIs are expressed using decimal notation (e.g., 0.001), unless they are below 0.0001 and then they are expressed using scientific notation. Results presented in the text are expressed using one significant figure. The use of one significant figure for reporting risk results is recommended by USEPA (1989). Results prior to rounding are shown in the tables. Presentation of results prior to rounding is intended to facilitate the checking of calculations by reviewers.

#### 2.7.2.1 Future Indoor Commercial Worker

For soil gas, potential migration of VOCs into indoor air was evaluated for the future indoor commercial worker. It is important to note that this is a future hypothetical risk as there are no structures currently located over the investigation areas. As shown in Table 2.15, based on the maximum chemical concentrations detected, the estimated excess lifetime cancer risk was $1 \times 10^{-7}$ and the hazard index was 0.002. These values are below the target cancer risk of $1 \times 10^{-6}$ and noncancer hazard index of one.

For soil, the following pathways were evaluated:

- Migration of VOCs into indoor air,
- Inhalation of windblown particulates,
- Incidental ingestion of soil, and
- Dermal contact with soil.

As shown in Table 2.16, based on the maximum chemical concentrations detected in soil, the estimated excess lifetime cancer risk was $4 \times 10^{-3}$ and the estimated noncancer hazard index was 38. The contribution to the cancer risk estimate by chemical class is as follows:

- VOCs: $4 \times 10^{-3}$
- SVOCs: $2 \times 10^{-9}$
- Pesticides: $9 \times 10^{-8}$
- Metals: $7 \times 10^{-8}$

As shown in Table 2.16, the estimated cancer risks for detected SVOCs, pesticides, and metals were well below the target cancer risk of $1 \times 10^{-6}$.

In the screening assessment, VOCs with an estimated risk greater than $1 \times 10^{-6}$ included:

- 1,1,2,2-Tetrachloroethane: $1 \times 10^{-3}$
- Tetrachloroethene: $3 \times 10^{-3}$
- Vinyl Chloride: $2 \times 10^{-4}$
- Trichloroethene: $2 \times 10^{-5}$
- 1,1,2-Trichloroethane: $6 \times 10^{-6}$
- 1,2-Dichloroethane: $6 \times 10^{-6}$
- Benzene: $5 \times 10^{-6}$

The contribution to the noncancer hazard index by chemical class is as follows:

- VOCs: 38
- SVOCs: 0.0001
- PAHs: 0.0002
- Pesticides: 0.001
- Metals: 0.008

As shown in Table 2.16, the estimated noncancer hazard indices for detected SVOCs, pesticides, and metals were well below the target of one.

In the screening assessment, VOCs with an estimated hazard index greater than 1 included:

- Tetrachloroethene: 34
- 1,2,4-Trimethylbenzene: 2

Table 2.17 presents the estimated cancer risks and noncancer hazard indices for the VOCs for each potential exposure pathway separately. As shown in this table, the major contributing exposure pathway to the risk estimate is inhalation of VOCs in indoor air.

#### 2.7.2.2 Future Outdoor Commercial Worker

For soil gas, potential migration of VOCs into ambient air was evaluated for the future outdoor commercial worker. As shown in Table 2.18, based on the maximum chemical concentrations detected, the estimated excess lifetime cancer risk was $1 \times 10^{-9}$ and the hazard index was <0.0001. These values are below the target cancer risk of $1 \times 10^{-6}$ and noncancer hazard index of one.

For soil, the following pathways were evaluated:

- Migration of VOCs into outdoor air;
- Inhalation of windblown particulates;
- Incidental ingestion of soil; and
- Dermal contact with soil.

As shown in Table 2.19, based on the maximum chemicals concentrations detected, the estimated excess lifetime cancer risk was $7 \times 10^{-5}$ and the estimated noncancer hazard index was 0.4. The contribution to the cancer risk estimate by chemical class is as follows:

- VOCs: $7 \times 10^{-5}$
- SVOCs: $2 \times 10^{-9}$
- Pesticides: $9 \times 10^{-8}$
- Metals: $7 \times 10^{-8}$

As shown in Table 2.19, the estimated cancer risks for detected SVOCs, pesticides, and metals were well below the target cancer risk of $1 \times 10^{-6}$.

In the screening assessment, VOCs with an estimated risk greater than 1 x $10^{-6}$ included:

- 1,1,2,2-Tetrachloroethane: 2 x $10^{-5}$
- Tetrachloroethene: 5 x $10^{-5}$
- Vinyl Chloride: 2 x $10^{-6}$

There were no chemicals with a HI greater than 1.

Table 2.20 presents the estimated cancer risks and noncancer hazard indices for the VOCs for each potential exposure pathway separately. As shown in this table, the major contributing exposure pathway to the risk estimate is inhalation of VOCs in ambient air.

### 2.7.3 Risk-Based Target Concentrations

The development of RBTCs for the protection of human health requires the same kinds of information and calculations used to develop the risk estimates. One can estimate the potential risk associated with a measured concentration of a chemical in a given media (i.e. soil gas or soil) or, alternatively one can calculate the concentration (i.e., RBTC) in that same media which would result in an acceptable cancer risk level or noncancer HI. Average concentrations (i.e., 95 percent upper confidence limit on the mean concentration) at or below the RBTC would support the conclusion that the human health risks within an exposure area (e.g., commercial lot) are within acceptable limits.

The purpose of developing the RBTCs is to evaluate potential future building construction at the Site. The RBTCs can be used to screen the soil gas and soil data collected at the Site to determine if further evaluation is needed (e.g., identification of an exposure area) or if there should be any future restrictions on the location of buildings at the Site. Based on the exceedences of the target cancer risks and hazard indices discussed in Section 2.7.2, RBTCs have been developed for all VOCs detected at the Site.

#### 2.7.3.1 Calculation of Risk-Based Target Concentrations

For carcinogenic chemicals, the equation used to calculate RBTCs due to exposure via inhalation of vapors in ambient or indoor air is as follows:

$$RBTC_{Carcinogen} = \frac{\text{Target Cancer Risk}}{[(CSF_{Inhalation} \text{ x } IF_{Inhalation})]}$$

Where:

$CSF_{inhalation}$ = Inhalation Cancer Slope Factor (mg chemical/kg body weight-day)$^{-1}$

$IF_{inhalation}$ = Intake Factor for inhalation of particulates or vapors (kg soil/kg body weight-day)

This same equation can be expanded for potential direct contact with soils as follows:

$$RBTC_{Carcinogen} = \frac{\text{Target Cancer Risk}}{[(CSF_{Inhalation} \times IF_{Inhalation}) + (CSF_{oral}(IF_{oral} + IF_{dermal})]}$$

Where:

$CSF_{inhalation}$ = Inhalation Cancer Slope Factor (mg chemical/kg body weight-day)$^{-1}$

$IF_{inhalation}$ = Intake Factor for inhalation of particulates or vapors (kg soil/kg body weight-day)

$CSF_{oral}$ = Oral Cancer Slope Factor (mg chemical/kg body weight-day)$^{-1}$

$IF_{oral}$ = Intake Factor for soil ingestion, (kg soil/kg body weight-day)

$IF_{dermal}$ = Intake Factor for dermal contact, (kg soil/kg body weight-day)

For noncarcinogens, the equation used to calculate RBTCs due to exposure via inhalation of vapors in indoor air is as follows:

$$RBTC_{Noncarcinogen} = \frac{\text{Target Hazard Index}}{\left[\frac{(IF_{Inhalation})}{RfD_{Inhalation}}\right]}$$

Where:

$IF_{inhalation}$ = Intake Factor for inhalation of particulates or vapors (kg soil/kg body weight-day)

$RfD_{inhalation}$ = Inhalation Reference Dose (mg chemical/kg body weight-day)

This same equation can be expanded for potential direct contact with soils as follows:

$$RBTC_{Noncarcinogen} = \frac{\text{Target Hazard Index}}{\left[\frac{(IF_{Inhalation})}{RfD_{Inhalation}} + \frac{(IF_{oral} + IF_{dermal})}{RfD_{oral}}\right]}$$

Where:

| | | |
|---|---|---|
| $IF_{inhalation}$ | = | Intake Factor for inhalation of particulates or vapors (kg soil/kg body weight-day) |
| $RfD_{inhalation}$ | = | Inhalation Reference Dose (mg chemical/kg body weight-day) |
| $IF_{oral}$ | = | Intake Factor for soil ingestion, (kg soil/kg body weight-day) |
| $RfD_{oral}$ | = | Oral Reference Dose (mg chemical/kg body weight-day); |
| $IF_{dermal}$ | = | Intake Factor for dermal contact, (kg soil/kg body weight-day) |

Route-specific intake factors (i.e., inhalation, oral, or dermal contact) were calculated based on the assumptions and equations presented in Section 2.4 and the air transfer factors presented in Section 2.5. CSFs and RfDs used in the calculations were presented in Section 2.6.

For this risk assessment, the calculated RBTCs correspond to a cancer risk of $1 \times 10^{-6}$. For noncancer health hazards, a target HI of one is identified. Individual chemical exposures that yield HIs of less than one are not expected to result in adverse noncancer health effects (USEPA, 1989).

The RBTCs are shown for the future indoor commercial worker in Table 2.21 and the future outdoor commercial worker in Table 2.22.

## 2.8 Uncertainties

The process of estimating risk has inherent uncertainties associated with the calculations and assumptions used. The approach used in this assessment has been health protective whenever possible and tends to overestimate exposures. A discussion of the key uncertainties used in the estimation of risk for this assessment is discussed below.

### 2.8.1 Exposure Assessment

Numerous assumptions must be made in order to estimate human exposure to chemicals. These assumptions include parameters such as daily breathing rates, skin surface area exposed to soil, human activity patterns, and many others. Many of the exposure assumptions used in the calculation of risks for this assessment are recommended by Cal/EPA and USEPA, and are often the upper $90^{th}$ or $95^{th}$ percentile values. The use of $90^{th}$ or $95^{th}$ percentile values, when available, is recommended by the USEPA in order to estimate the "Reasonable Maximum

Exposure" that may occur at a site. However, the combination of several upper-bound estimates used as exposure parameters may substantially overestimate chemical intake.

### 2.8.2 Fate and Transport Modeling

Uncertainty is associated with modeling any physical process. The magnitude of this uncertainty, the sensitivity of the model to uncertain parameters, and the model objectives affect how the results can be used. Two types of uncertainty exist in simulating subsurface flow and transport processes: model uncertainty and parameter uncertainty. Each type of uncertainty is discussed further below.

Model uncertainty relates to the computational methods and simplifying assumptions employed by the model code to simulate the physical system. The Johnson and Ettinger model (used to simulate subsurface soil gas migration) has been shown to predict particular field-measured conditions adequately. The code was developed under contract to the USEPA from a model previously published in a peer-reviewed journal (USEPA, 2000; Johnson and Ettinger, 1991).

Parameter uncertainty includes measurement errors inherent in field studies as a result of equipment limitations, measurement errors, and incomplete knowledge of surface and subsurface conditions. These parameter uncertainties manifest themselves in the model as uncertainties in boundary conditions, flow parameters, and transport parameters. These in turn produce uncertainty in the model results, such as soil gas migration rates and chemical migration rates.

There is uncertainty in parameters affecting soil gas emissions into indoor air, including uncertainty in soil permeability, fraction of surface cover that is open, pressure differential, and air exchange rates. In general, where parameters were uncertain, conservative values were chosen.

### 2.8.3 Toxicity Assessment

Available scientific information is insufficient to provide a thorough understanding of all the toxic properties of each of the chemicals to which humans may be exposed. It is generally necessary, therefore, to infer these properties by extrapolating them from data obtained under other conditions of exposure, generally in laboratory animals. Although reliance on experimental animal data has been widely used in general risk assessment practices, chemical absorption, metabolism, excretion, and toxic responses may differ between humans and the species for which experimental toxicity data are available. Uncertainties in using animal data to predict potential effects in humans are introduced when routes of exposure in animal studies

differ from human exposure routes, when the exposures in animal studies are short-term or subchronic, and when effects seen at relatively high exposure levels in animal studies are used to predict effects at the much lower exposure levels found in the environment. Uncertainties in the toxicological assessments for carcinogens and noncarcinogens are discussed below.

#### 2.8.3.1 Carcinogens

First, the use of animal data presents an uncertainty in predicting carcinogenicity in humans. While many substances are carcinogenic in one or more animal species, only a small number of substances are known to be human carcinogens, raising the possibility that not all animal carcinogens are human carcinogens and that not all human carcinogens are animal carcinogens.

The development of CSFs for carcinogens is predicated on the assumption generally made by regulatory agencies that no threshold exists for carcinogens (i.e., that there is some risk of cancer at all exposure levels above zero). The no-threshold hypothesis for carcinogens, however, may not be valid for all substances.

#### 2.8.3.2 Noncarcinogens

In order to adjust for uncertainties that arise from the use of animal data, regulatory agencies often base the reference dose (RfD) and reference concentration (RfC) for noncarcinogenic effects on the most sensitive animal species (i.e., the species that experiences adverse effects at the lowest dose). These doses are then adjusted via the use of safety or uncertainty factors. The adjustment compensates for the lack of knowledge regarding interspecies extrapolation, and guards against the possibility of humans being more sensitive than the most sensitive experimental animal species tested. The use of uncertainty factors is considered to be protective of health. In addition, when route-specific toxicity data were lacking, RfDs were extrapolated from one route to another (i.e., oral to dermal). Due to the absence of contrary data, equal absorption rates were assumed for both routes.

### 2.8.4 Uncertainties in Risk

The USEPA (1989) notes that the conservative assumptions used in risk assessments are intended to assure that the estimated risks do not underestimate the actual risks posed by a site and that the estimated risks do not necessarily represent actual risks experienced by population at or near a site. By using standardized conservative assumptions in a risk assessment, USEPA further states that:

"These values are upperbound estimates of excess cancer risk potentially arising from lifetime exposure to the chemical in question. A number of assumptions have been made in the derivation of these values, many of which are likely to over-estimate exposure and toxicity. The actual incidence of cancer is likely to be lower than these estimates and may be zero." (USEPA, 1989)

The risk estimates developed in this assessment are based primarily on a series of conservative assumptions. The use of conservative assumptions tends to produce upper-bound estimates of risk. Although it is difficult to quantify the uncertainties associated with all the assumptions used in this assessment, the use of conservative assumptions is likely to result in a substantial overestimate of exposure, and hence, risk.

### 2.9 Summary and Conclusions

The purpose of the screening HHRA was to evaluate the reasonable potentially complete pathways and potentially exposed human receptors at the Site. There are no current on-site workers. Current populations of concern would be on-site trespassers. As the Site is expected to remain commercial/industrial, future on-site populations will include on-site workers and visitors. Future on-site workers are expected to be on-site with greater frequency and duration than trespassers or visitors and, therefore would be the maximum exposed population. Only the future on-site worker is evaluated in this screening HHRA. Any health risks to trespassers or visitors would be lower than those estimated for on-site workers. The potential exposure pathways of concern at the Site include direct contact with soil and the migration of vapors from soil into indoor and outdoor air. Potential routes of exposure include inhalation of vapors and/or windblown particulates, incidental ingestion of soil, and dermal contact with soil.

As a first screening step, all cancer risks and noncancer HIs were calculated using the maximum concentrations detected in each medium. For soil gas, the results of the screening HHRA show that the estimated cancer risks are less than $1 \times 10^{-6}$ and the noncancer HIs are less than 1 for both the indoor and outdoor commercial worker. For soil, the results of the screening HHRA show that for SVOCs, pesticides, PAHs, and metals the estimated cancer risks are less than $1 \times 10^{-6}$ and the noncancer HIs are less than 1 for both the indoor and outdoor commercial workers. For VOCs, the estimated cancer risk is $4 \times 10^{-3}$ for indoor commercial workers and $7 \times 10^{-5}$ for outdoor commercial workers. The major chemical contributors to the risk estimates are 1,1,2,2-tetrachloroethane, tetrachloroethene, vinyl chloride, trichloroethene, 1,1,2-trichloroethane, 1,2-dichloroethane, and benzene. Also for VOCs, the estimated noncancer HI is 38 for indoor commercial workers and 0.4 for outdoor commercial workers. The major chemicals contributors to the HIs are tetrachloroethene and 1,2,4-trimethylbenzene.

RBTCs were developed for all VOCs detected in soil at the Site. The purpose of developing the RBTCs is to evaluate potential future building construction at the Site. The RBTCs can be used to screen the soil gas and soil data collected at the Site to determine if further evaluation is needed (e.g., identification of an exposure area), if remediation is needed, or if there should be any future restrictions on the location of buildings at the Site.

# 3.0 REMEDIAL ACTION OBJECTIVES AND ARARs

## 3.1 Chemicals of Potential Concern (COPCs)

As presented in Section 2.0, the COPC selection process began with identifying human populations and complete exposure pathways to conduct a quantitative risk assessment. Next, an exposure assessment was conducted to estimate the magnitude of the actual or potential human exposures to chemicals in the soil at the Site. Subsequently, chemical migration by volatilization from the soil into indoor and outdoor spaces was estimated using appropriate fate and transport modeling. Toxicity values were identified for the chemicals evaluated, which was used in the risk characterization. The risk characterization combined and analyzed the results of the exposure and toxicity assessments in order to characterize the potential for adverse health effects to occur as a result of exposure to Site-related chemicals. Those chemicals that posed a carcinogenic risk above $10^{-6}$ or a HI above 1 were considered COPCs.

## 3.2 Development of Remedial Action Objectives

The California Hazardous Substances Account Act (HSAA) incorporates the NCP by reference[1], including its broad directive to protect public health and the environment, and to comply with ARARs. The primary remedial action objectives (RAOs) for the Site are as follows:

- Reduce human health risks
- Reduce risks to the environment
- Comply with ARARs

A secondary RAO is to allow future Site use consistent with its designated zoning. The RAOs for the Site are described in the following sections.

### 3.2.1 Reduction of Human Health Risks

The HHRA for the Site was presented in Section 2.0 of this presumptive FS. According to the results of the HHRA, the Site, under current conditions, presents a potential health risk to

[1] Health & Safety Code Sections 25350 and 25356.1(d)

current off-site residents and workers. Contaminated soil at the Site are potential sources of chemicals that can migrate to on-site and off-site receptors through the air.

According to the NCP, lifetime incremental cancer risks posed by a site should not exceed $10^{-4}$ to $10^{-6}$. For noncancer health hazards, a target HI of 1 is identified. As a risk management policy, the Cal/EPA generally considers $1 \times 10^{-6}$ to be a point of departure for purposes of making risk management decisions, with most approved remediations achieving incremental risk levels of 10 in 1 million ($1 \times 10^{-5}$) or lower. The California Safe Drinking Water and Toxic Enforcement Act ("Proposition 65") considers $1 \times 10^{-5}$ as a no significant risk level. While the RBTCs calculated in Section 2.0 use a cancer risk of $10^{-6}$, the remediation goals presumed in this presumptive FS are to reduce the overall risk from all chemicals to below the $10^{-5}$ level. A cumulative HI of 1 is still used to define remediation goals.

### 3.2.2 Reduction of Risks to the Environment

Besides reducing human health risk, another RAO for the Site is to reduce risks to the environment. Adverse impact to the environment may occur via the migration of COPCs to shallow ground water.

### 3.2.3 Compliance with ARARs

The ARARs for remedial actions at the Site are discussed in Section 3.4. All remedial actions proposed in this presumptive FS must comply with the ARARs.

### 3.2.4 Consideration of Designated Future Land Use

In the future, the Site land use is expected to remain commercial/industrial.

## 3.3 Preliminary Remediation Action Levels

ENVIRON compared the concentrations of chemicals at the Site to the PRGs to help evaluate the distribution and significance of the detected chemicals. The RI report and the HHRA identified the COPCs that are detected at concentrations exceeding the PRGs. The RI also identified the areas of the Site where such concentrations have been found. As part of the presumptive FS, RBTCs were developed for the Site. RBTCs, which are discussed in Section 2.7, are media-specific (i.e., soil) concentrations derived for specific land-use scenarios that are believed to be protective of human health and the environment.

## 3.4 Description of ARARs

### 3.4.1 General

CERCLA, as amended by the Superfund Amendments and Reauthorization Act (SARA) of 1986, require that remedial actions achieve the protection of human health and the environment. In addition, the remedial actions must attain and be consistent with ARARs, unless waived or granted a variance by the USEPA. ARARs are legally enforceable standards, criteria, or limits promulgated under federal or state law.

The terms "applicable" and "relevant or appropriate" requirements are defined in the NCP[2] as follows:

- "The term "Applicable Requirements" means those cleanup standards, standards of control, and other substantive requirements, criteria, or limitations promulgated under federal environmental or state environmental or facility citing laws that specifically address a hazardous substance, pollutant, contaminant, remedial action, location, or other circumstance found at a CERCLA site . . . ."
- "The term "Relevant and Appropriate Requirements" means those cleanup standards, standards of control, and other substantive requirements, criteria, or limitations promulgated under federal environmental or state environmental or facility citing laws that, while not applicable to a hazardous substance, pollutant, contaminant, remedial action, location, or other circumstance at a CERCLA site, address problems or situations sufficiently similar to those encountered at the CERCLA site that their use is well suited to the particular site . . . ."

Federal and state non-promulgated standards (standards which are not of general applicability or are not legally enforceable), policies, or guidance documents, and local requirements are not ARARs. However, these criteria may be considered for a particular release when evaluating remediation necessary to protect human health and the environment.

ARARs fall into one of the three identified categories: chemical-specific, location-specific, and action-specific. Chemical-specific ARARs are health or risk-based numerical limitations or standards that apply to site-specific conditions. Location-specific ARARs are restraints placed on activities conducted in a specific location. Action-specific ARARs are technology- or activity-based requirements or limitations on actions taken with respect to hazardous waste or Site remediation activities.

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[2] 40 CFR 300.5

Identification of ARARs is based on the following:

**Chemicals of Potential Concern (COPCs)**

The major chemical contributors to the risk estimates, and thus the COPCs, are 1,1,2,2-tetrachloroethane, tetrachloroethene, vinyl chloride, trichloroethene, 1,1,2-trichloroethane, 1,2-dichloroethane, 1,2,4-trimethylbenzene, and benzene.

**Potentially Affected Environmental Media**

Soil is the primary potentially affected medium.

### 3.4.2 Potential Chemical-Specific Requirements

The potential chemical-specific ARARs identified for remedial action alternatives at the Site include both Federal and State regulations. Certain remedial action alternatives may produce regulated emissions including loading, unloading, compaction, and on-site storage and treatment of contaminated soil and transfer operations, which may lead to volatilization of organic contaminants. Details and descriptions of each potential chemical-specific ARAR are summarized in Table 3.1.

### 3.4.3 Potential Location-Specific Requirements

The location-specific ARARs identified for proposed remedial alternatives at the Site include the Resource Conservation and Recovery Act (RCRA)[3] and the regulations promulgated under RCRA.[4] RCRA regulates the generation, management, and disposal of solid and hazardous waste. Certain remedial actions chosen for the Site may include the generation and disposal of solid or hazardous waste subject to RCRA requirements, which are, therefore, potentially applicable or relevant and appropriate to the Site.

Potential water quality ARARs for remedial action alternatives at the Site include the Clean Water Act (CWA)[5] and the regulations promulgated under the CWA.[6] ARARs are also identified in the Safe Drinking Water Act (SDWA) and the regulations promulgated under the SDWA.[7]

The CWA regulates the discharge of nontoxic and toxic pollutants into surface water by municipal sources, industrial sources, and other specific and non-specific sources. The CWA

[3] 42 USC 6901 *et seq*

[4] 40 CFR 240-271

[5] 33 USC 1251 *et seq*

[6] 40 CFR 100-140 and 40 CFR 400-470

[7] 42 USC 300 (f) *et seq*

also specifies water quality criteria, requirements for state water quality standards based on these criteria, and wetlands regulations.

### 3.4.4 Potential Action-Specific Requirements

The potential action-specific ARARs identified for remedial action alternatives at the Site include the Hazardous Waste Control Act (HWCA), Mulford-Carrell Air Resources Act as implemented by the South Coast Air Quality Management District (SCAQMD) and administered by the California Air Resources Board, the California SDWA, and the California Occupational Safety and Health Act (OSHA) are potential action-specific ARARs applicable to this Site.

### 3.4.5 Other Federal and State Laws

Other federal laws were reviewed as potential ARARs but were judged not to contain standards or regulations pertinent to the RAOs at the Site. These laws include, but are not limited to, the Toxic Substances Control Act (TSCA), the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA), and the National Environmental Policy Act (NEPA).

In addition, laws regulating activities based on specific historical or environmental features do not appear to be potential ARARs at the Site. These laws include, but are not limited to, the National Historic Preservation Act, and the Wilderness Act.

# 4.0 DETAILED ANALYSIS OF THE PRESUMPTIVE REMEDY ALTERNATIVES

## 4.1 Introduction

Because the soil at the Site is affected by VOCs, ENVIRON selected the presumptive remedy approach, in accordance with the USEPA (1993b) guidance for conducting a presumptive FS under CERCLA and in general accordance with the USEPA (1988a) guidance for conducting an FS under CERCLA. The presumptive FS was conducted to evaluate remedial alternatives responsive to the RAOs identified in Section 3.2. The need for soil remediation at the Site was assessed based on potential risks to human health and the environment.

The presumptive FS was conducted using the following steps. First, presumptive response actions that are appropriate for addressing the remediation of the waste and waste-containing materials at the Site were identified according to procedures outlined by the USEPA (USEPA, 1993b; see Section 4.2). Second, for each response action, prescribed presumptive remedial technologies and their associated process options were evaluated (Section 4.3). Third, an additional screening was performed based on relative cost of the process options within each technology (Section 4.4). Fourth, a detailed evaluation of the remedial alternatives was conducted using the nine criteria required by the NCP (Section 4.5). Finally, based on a comparative analysis of the remedial alternatives, a preferred alternative was recommended for the Site (Section 4.6).

## 4.2 Prescribed Response Actions

Based on the RAOs described in Section 3.2 and on recommendations by the USEPA (1993b), the presumptive response actions that are appropriate for the affected materials at the Site include:

1. No action
2. Source removal and *ex situ* treatment and/or disposal or recycling
3. *In situ* treatment
4. Combination of *in situ* treatment and source removal and *ex situ* treatment and/or disposal

The response actions are discussed in the following sections.

### 4.2.1 No Action

A no action response provides a baseline assessment for comparison with other response actions that consist of greater levels of response. A no action response may be considered appropriate when the associated risk is within the acceptable range, or when an alternative response action may cause a greater environmental or health danger than the no-action response itself. An evaluation of the no action response is required by the NCP as part of the FS process and by the USEPA as part of the presumptive FS process.

### 4.2.2 Source Removal with *Ex Situ* Treatment and/or Disposal or Recycling

Affected materials at the Site can be removed by excavation. The removed affected materials can be (1) treated and re-used on-site; (2) treated on-site and transported off-site for disposal or recycling; or (3) transported off-site for treatment, disposal, or recycling. Removal and treatment/disposal (collectively referred to as source removal) can reduce or eliminate the COPCs present in the affected materials as well as the exposure pathways for human and other biological receptors. Therefore, response actions involving source removal are consistent with the Site's RAOs of reducing risks to human health and the environment, and mitigating the on-site sources.

Removal can be achieved by excavation using conventional construction equipment. Removal requires ambient air monitoring; implementation of dust, odor, and volatile emission control measures; and storm water management, as described in Section 5.3. Removal will also need proper on-site or off-site treatment and/or disposal or recycling of the removed material.

### 4.2.3 *In Situ* Treatment

*In situ* treatment provides for immobilization, destruction, breakdown, or removal of contaminants from the medium without removing the medium itself. Removal of contaminants will require subsequent on-site or off-site treatment and/or disposal or recycling of the affected media.

### 4.2.4 Combination of *In Situ* Treatment and Source Removal and *Ex Situ* Treatment and/or Disposal

By combining an *in situ* remediation process with an *ex situ* process aimed at removing VOCs from the "hot spot" of contamination, the remedial actions may be more effective and the overall remediation time and cost may be reduced.

### 4.3 Prescribed Presumptive Remedial Technologies

The identified remedial technologies for the affected materials at the Site are discussed in the following sections.

#### 4.3.1 No Action

Under the no action alternative, no action will be taken to contain, treat, or remove the affected soils present at the Site. The existing walls and gate around the Site would restrict direct contact with affected soils by trespassers.

Based on the results of the HHRA presented in Section 2.0 and taking into account the planned future uses of the Site, ENVIRON concluded that the Site, in its current condition, i.e., under a no action scenario, presents a health risk to off-site residents, off-site workers, trespassers, and hypothetical on-site workers.

Although the no action alternative does not reduce risk at the Site, a detailed evaluation of the alternative was performed, as required by NCP (see Section 4.6).

#### 4.3.2 Source Removal and *Ex Situ* Treatment and/or Disposal / Recycling

"Treatment" is broadly defined as any method of modifying the chemical, biological, and/or physical character or composition of a waste. *Ex situ* treatment may include on-site or off-site treatment of the removed materials. The USEPA prescribes specific processes that are effective in removing VOCs in soils as part of the presumptive remedial approach (USEPA, 1993b). In certain cases, the USEPA allows for alternative remedies under the presumptive approach to enable the effective management of contaminated media.

Certain portions of the Site contain significantly high concentrations of chlorinated VOCs (e.g., exceeding 100,000 µg/kg) that may be more amenable to treatment by *ex situ* methods. Specifically, the highest concentrations of PCE (221,000 µg/kg), as well as high concentrations of 1,2,4-trimethylbenzene (1,2,4-TMB) and TCE are found in Boring SB1, at a depth of 10 feet bgs. The concentrations of PCE found at this location are the largest contributor to the cancer risks and HI calculated as part of the HHRA (Section 2.0); 1,2,4-TMB is the second largest contributor to the HI. Boring SB1 and the area surrounding it is therefore considered a "hot spot." Acetone is the only other VOC — though not a chlorinated VOC — that has been reported in soil samples at concentrations exceeding 100,000 µg/kg in Boring SB3. However, the highest reported concentration of acetone at the Site, 279,000 µg/kg in Boring SB3 at 5 feet bgs, is significantly below the RBICs as calculated in the HHRA. As such, the area surrounding Boring SB3 is not considered a "hot spot."

The "hot spot" will be excavated to achieve final acceptable average soil concentrations across the Site, as prescribed by the HHRA. The spatial extent of excavation will be decided based on VOC concentrations in soils in adjacent borings. The clean overburden soil will be stockpiled on-site for use as backfill material. The contaminated soil will be transported off-site for treatment and/or disposal. These processes are discussed in the following sections.

#### 4.3.2.1 Off-Site Disposal/Recycling

In this presumptive FS report, the term "disposal" refers to landfill disposal, and the term "recycling" in this context refers to use of the Site soil for landfill cover material or similar uses. Recycling also entails the decontamination of the soil by thermal desorption or incineration for possible future use as fill material. The land disposal restrictions require that hazardous wastes be treated to meet either RCRA or non-RCRA treatment standards prior to land disposal.

ENVIRON considered off-site disposal to be too expensive to be considered for the bulk of the affected soils at the Site. However, this option is potentially attractive for relatively small volumes of contaminated soils at the Site, i.e., removal of "hot spots." The advantages of this approach are that it is simple to implement and will effectively remove the contaminated media from the Site in an expeditious manner. The disadvantages include dust and truck traffic generation.

#### 4.3.2.2 *Ex Situ* Soil Vapor Extraction (SVE)

In this process a vacuum is applied to the excavated soils placed in a covered aboveground stockpile to volatilize and remove contaminants. SVE is the prescribed presumptive *in situ* technology for VOCs in soils and can be easily adapted for *ex situ* application in stockpiled soils. SVE is prescribed because it has been shown to be the most effective and commonly used process for remediation of VOC-contaminated soils (USEPA, 1993b). The advantages of this process are that the process is well understood, effective, and easy to implement.

#### 4.3.2.3 *Ex Situ* and Off-Site Thermal Desorption

The USEPA recommends thermal desorption as the primary presumptive remedy for *ex situ* treatment of VOC-contaminated soils. In this process, thermal energy is used to destroy contaminants or to separate contaminants from the affected media. Low temperature thermal desorption uses relatively low amounts of energy to physically separate organic contamination from affected media at temperatures of 300°F to 700°F. In this process soils containing organic contaminants are heated, driving off the water

and organic contaminants and producing a dry solid containing trace amounts of the organic residues. The volatilized contaminants are not oxidized and require a condenser, an afterburner, or must be captured on a carbon bed (California Department of Health Services [DHS], 1991). Thermal desorption can be applied on-site in transportable treatment units (TTUs), which have been demonstrated to have the capacity to treat large volumes of material. According to DHS (1991) and the California Base Closure Environmental Committee (CBCEC; 1994), the main advantages of thermal desorption are that it is simple to implement and energy costs are lower than other high temperature systems (e.g., rotary kilns).

#### 4.3.2.4 *Ex Situ* and Off-Site Incineration

Incineration is considered by the USEPA as the secondary *ex situ* presumptive remedy. During incineration, high temperature thermal technologies use combustion temperatures in excess of 1,650°F to destroy or detoxify hazardous wastes. As described by DHS (1991) and CBCEC (1994), rotary kiln is a high temperature incinerator that consists of a slightly inclined, refractory-lined cylinder to control combustion of organic wastes under excess air conditions (i.e., the final oxygen concentration is significantly greater than zero). Wastes are introduced into the high end of the kiln and passed through the combustion zone. Retention times can vary from several minutes to an hour or more. Wastes are substantially oxidized to gases and inert ash within the combustion zone. Ash is removed at the lower end of the kiln. Flue gases are normally passed through a secondary combustion chamber and then through conventional air pollution control units, which limit the emissions of particulate matter, acid gases and oxides of nitrogen. The rotary kiln can incinerate a wide variety of liquid, sludge, and solid wastes independently or in combination. According to DHS (1991) and CBCEC (1994), the main advantages of incineration are that it can handle a wide variety of contaminated media and it can achieve high destruction and removal efficiencies.

Currently, the SCAQMD does not allow on-site incineration of contaminated soils. Thus, the contaminated material will have to be hauled to an off-site facility for processing.

### 4.3.3 *In Situ* Treatment

*In situ* treatment generally refers to the reduction in mobility of the COPCs or reduction of COPC concentrations by either natural or enhanced degradation processes, without prior removal of the contaminated media. The only presumptive technology recommended by the USEPA for *in situ* application for soils contaminated by VOCs is SVE (USEPA, 1993b). This

process is similar to *ex situ* SVE except that the VOCs are removed directly from the *in situ* soils. Hot air may also be used to enhance volatilization of contaminants.

### 4.3.4 Combination of Alternatives 2 and 3

In certain cases (e.g., heterogeneous soil types across a site or varying composition of contaminants across a site), the USEPA allows for combining remedies in order to manage effectively the different contaminated media (USEPA, 1993b). In the case of the Site, certain volumes of soil are affected by elevated concentrations of VOCs, for which SVE might not be an effective remedy For these soils, a viable approach may include excavation and *ex situ* treatment (either on-site or off-site) using prescribed remedies such as SVE, thermal desorption, or incineration. For the Site, excavation will concentrate on the "hot spot," which includes soils in the general vicinities of Borings SB1. Once the "hot spot" has been removed, the rest of the contamination at the Site can be addressed using medium to high vacuum SVE, as described in Section 4.3.3

## 4.4 Preliminary Screening and Estimated Costs of Alternatives

The remedial technologies and process options presented above were assembled into remedial alternatives for the Site. The remedial alternatives include the following:

1. Alternative 1 – No Action
2. Alternative 2 – Excavation and
    a. Off-site Disposal/Recycling
    b. SVE
    c. Off-site Thermal Desorption
    d. Off-site Incineration
3. Alternative 3 – *In situ* SVE
4. Alternative 4 – *In situ* SVE combined with "Hot Spot" Excavation and
    a. Off-site Disposal/Recycling
    b. *Ex situ* SVE
    c. Off-site Thermal Desorption
    d. Off-site Incineration

ENVIRON performed a preliminary screening of the identified alternatives for the Site, based on effectiveness, implementability, and cost. Effectiveness was evaluated based on the proven reliability of the alternative to achieve the RAOs. Implementability was evaluated based on the availability of the technology and the ease of implementation and permitting. Cost was evaluated based on the total cost to implement the remedial alternative. The results of the screening based on

effectiveness, implementability, and cost are presented in Table 4.2. This table describes the reasons for retaining or rejecting each process. The "no action" response presented in Table 4.2 was retained as a baseline alternative, as required by presumptive remedy approach (USEPA, 1993a). Based on this screening, the alternatives retained for further consideration under the NCP criteria were the following: 1) Alternative 1: "No Action", retained as required by the USEPA (1993a); 2) Alternative 4a: *In situ* SVE combined with "hot spot" excavation and off-site disposal/recycling; and 3) Alternative 4b: *In situ* SVE combined with "hot spot" excavation and *ex situ* SVE.

### 4.5 Detailed Evaluation of the Alternatives

The NCP mandates a detailed evaluation of the remedial alternatives, involving assessing each of the remedial alternatives against nine NCP criteria and a comparison of the relative performance of the remedial alternatives against those criteria. The nine NCP evaluation criteria are:

1. Overall protection of human health and the environment
2. Compliance with ARARs
3. Long-term effectiveness and permanence
4. Reduction of toxicity, mobility, or volume through treatment
5. Short-term effectiveness
6. Implementability
7. Cost
8. State acceptance
9. Community acceptance

An alternative must meet Criteria 1 and 2, known as "threshold criteria," in order to be recommended. Criteria 3 through 7, known as "balancing criteria," are evaluated to determine the best overall solution. After public comment, the DTSC may alter its preference on the basis of the last two "modifying" criteria. A discussion of the nine criteria follows:

1. *Overall protection* of human health and the environment determines whether an alternative eliminates, reduces, or controls threats to public health and the environment through institutional controls, engineering controls, or treatment.
2. *Compliance with* ARARs evaluates whether the alternative meets state and federal environmental laws, regulations, and other requirements that pertain to the site and, if not, whether a waiver is justified.
3. *Long-term effectiveness* and permanence considers the ability of an alternative to maintain protection of human health and the environment over time, and the reliability of such protection.
4. *Reduction of* toxicity, mobility, or volume evaluates an alternative's use of treatment to

reduce the harmful effects of principal contaminants, their ability to move in the environment, and the amount of residual contamination remaining.

5. *Short-term effectiveness* considers how fast the alternative reaches the cleanup goal and the risks the alternative poses to workers, residents, and the environment during construction or implementation of the alternative.
6. *Implementability* considers the technical and administrative feasibility of implementing the alternative, such as relative availability of goods and services. Also, considers if the technology has been used successfully on other similar sites.
7. *Cost* includes estimated capital and operations and maintenance (O&M) costs, as well as present worth costs.
8. *State acceptance* considers whether the DTSC agrees with the analyses and recommendations of the RI/FS and the RAP.
9. *Community acceptance* should be evaluated after public comment period on the RAP.

Detailed evaluation criteria for the nine NCP criteria are summarized in Table 4.1. Applications of these criteria to the three alternatives retained after the preliminary screening are presented in Tables 4.3 through 4.5.

## 4.6 Comparative Evaluation of the Alternatives

The relative performance of each of the three alternatives retained after the screening process against the nine NCP criteria is given in Table 4.6, based on the information in Tables 4.2 through 4.5. The purpose of the comparative evaluation presented in Table 4.6 was to select a preferred remedial alternative that will be most suitable for the Site, based on the NCP criteria.

Alternative 1 (no action) fails to meet the site RAOs, i.e. reduce human health and environmental risks and comply with ARARs. As shown in Table 4.6, the No Action alternative has low scores using the nine NCP criteria.

Alternatives 4a and 4b meet the primary RAOs for the Site, the secondary RAO of providing for the reuse of the Site as anticipated by the Site's current zoning, and most of the NCP criteria. As presented in Table 4.6, Alternative 4a satisfies all NCP criteria satisfactorily except for Criterion 4: reduction of toxicity, mobility, or volume. Since the excavated soil from the "hot spot" will be transported off-site for disposal as hazardous waste, the volume and the future toxicity and mobility of the contaminants are not reduced. Under Alternative 4b, the excavated soil from the "hot spot" will be treated on-site by *ex situ* SVE and either spread on site, if approved and certified as "clean" by DTSC, or taken off-site for disposal as non-hazardous waste. As such, the contaminants will be transferred from the on-site soils to the GAC. Once the GAC from the vessels have been regenerated, the volume and future toxicity and mobility of the contaminants will be reduced. Thus,

Alternative 4b, which includes an *in situ* SVE system combined with "hot spot" excavation and on-site and *ex situ* SVE is the most suitable remedial strategy for the Site. This alternative meets all primary and secondary RAOs and will effectively and efficiently remediate the soils at the Site.

# 5.0 PREFERRED ALTERNATIVE FOR THE SITE

## 5.1 Introduction

The presumptive FS process followed by ENVIRON consisted of several steps. It was initially determined that the Site qualifies for a presumptive FS because the soils are impacted by VOCs. Therefore, the FS was reduced in scope and considered only the treatment technologies endorsed by the USEPA under the presumptive remedy approach (USEPA, 1993b). Next, a screening HHRA was performed to identify the COPCs and their related RBTCs at the Site. Based on this HHRA, presumptive remedial action objectives and ARARs were defined for the Site. Then, affected media at the Site and their approximate extents were defined. This was followed by considering various technologies and their associated process options for addressing the wastes at the Site under the presumptive remedial approach. These processes were assembled into remedial alternatives.

The alternatives developed included no action (Alternative 1), excavation and disposal/recycling (Alternative 2), *in situ* SVE (Alternative 3), and a combination of alternatives 2 and 3 (Alternative 4). Next, this set of alternatives was screened based on their effectiveness, implementability, and relative cost. A detailed evaluation of these remedial alternatives was performed using the nine criteria required by the NCP. Based on the screening and the NCP analysis, Alternative 4b was considered as the most suitable remedial alternative for the Site.

Alternative 4b consists of a combination of *in situ* SVE and excavation and on-site *ex situ* SVE treatment. Soil in the portion of the Site affected by elevated concentrations of VOCs (described previously), will be excavated, stockpiled on-site, and treated using a network of *ex situ* SVE pipes. The remainder of the contaminated soils will be treated with an *in situ* SVE system. The extracted vapors from both systems will be passed through a series of two granular activated carbon (GAC) vessels for removal of VOCs from the vapor phase. The vacuum pump for the *in situ* SVE system will be used to impart the necessary vacuum in the *ex situ* SVE system.

The remediated Site will be regraded for commercial and/or industrial redevelopment. The Site grading requirements will be developed based on the needs and requirements of the Site owners and the City of Los Angeles.

## 5.2 Conceptual Design of the Main Alternative 4b Processes

The main processes that will be included in the implementation of Alternative 4b include the following:

- Excavation of soil within the "hot spot" at the Site and on-site stockpiling;
- Installation of extraction wells for *in situ* and *ex situ* SVE operations;
- SVE operation and carbon treatment of off-gas; and
- Off-site transport and disposal of excavated soil from "hot spot" or reuse of such soil at the Site, if accepted by DTSC.

Conceptual designs for these processes are presented in the following sections.

### 5.2.1 Excavation of the "Hot Spot"

The "hot spot" identified earlier in this report consists of soils contaminated by chlorinated VOCs at concentrations exceeding 100,000 µg/kg. Specifically, the highest concentrations of PCE (221,000 µg/kg), as well as high concentrations of 1,2,4-TMB and TCE are found in Boring SB1, at a depth of 10 feet bgs. The concentrations of PCE found at this location are the largest contributor to the cancer risks and HI calculated as part of the HHRA (see Section 2.0). 1,2,4-TMB is the second largest contributor to the HI. Boring SB1 and the area surrounding it is considered a "hot spot" of impacted soil and will be excavated to achieve final acceptable average soil concentrations across the Site, as prescribed by the HHRA. Shoring, if required, will be used as appropriate to stabilize the excavation sites. The spatial extent of excavation depends on VOCs concentrations in soils in borings adjacent to the "hot spot." The excavated soil will be stockpiled on site and prepared for *ex situ* treatment by SVE (described in section 5.2.3). The volume of soil requiring excavation is estimated to encompass an approximately 30-foot by 20-foot surficial area, to a depth of approximately 15 feet.

### 5.2.2 Installation of *In Situ* SVE system

Based on the subsurface geology in the upper 25 to 30 feet at the Site, ENVIRON estimates that a radius of influence of approximately 25 feet is achievable from each vapor extraction well. To confirm this assumption, an SVE pilot test will be performed at the Site prior to full-scale implementation of the remedy. Based on the assumption of a 25-foot radius of influence, up to five vapor extraction wells will be installed at appropriate depths and in the general vicinities of the remainder of the borings with elevated concentrations of VOCs. A medium to high vacuum system will be utilized because most of the soils on-site are silty sands and clays with low air permeabilities. The five wells will be connected to a single GAC

system consisting of two 1,000-pound (lb) carbon vessels, which will be used to treat the VOCs in the well vapors.

### 5.2.3 Installation of *Ex Situ* SVE system

Soil in the portion of the Site, which is affected by elevated concentrations of VOCs (described previously), will be excavated and stockpiled on-site. A network of aboveground piping, to which a vacuum is applied to enhance volatilization of VOCs, will be placed within the soil stockpile. The soil piles will be covered and underlain with plastic sheets to prevent volatile emissions and to prevent the soil from becoming saturated by precipitation. Air circulation inside the covered stockpile will be provided by the installation of air inlets. The extracted vapors will then be passed through the same GAC system used for the *in situ* SVE system. The carbon vessel outflows will be monitored to determine time of breakthrough, at which point, the carbon in the vessels will be exchanged with new, virgin carbon. The vacuum pump for the *in situ* SVE system will be used to impart the necessary vacuum in the *ex situ* SVE system. The *ex situ* SVE piping will be connected to the manifold of the *in situ* SVE system and the same carbon beds will be used to treat the off-gas from both the *in situ* and *ex situ* SVE systems.

### 5.2.4 SVE Operation

It is anticipated that six to twelve months of remediation will be necessary to reduce soil concentrations to acceptable levels. This estimate is based on ENVIRON's previous experience with similar systems installed at similar sites. Upon completion of the remediation, ENVIRON will discuss with DTSC whether the treated stockpiled soil can be certified as "clean" and spread on-site or taken off-site for disposal as non-hazardous waste

In addition, upon completion of the remedial activities, and depending on the residual contaminant concentrations at the Site, the following options will be evaluated: (1) performing an HHRA under a residential scenario to allow for unrestricted future land use if residual concentrations are below such scenario; and (2) recording a deed restriction to limit the Site for commercial and industrial use, per its current zoning at the City of Los Angeles, if residual concentrations are at or near the commercial scenario, as presented in the HHRA portion of this report.

## 5.3 Mitigation Measures

### 5.3.1 Air Monitoring

Ambient air monitoring will be implemented continuously during all remedy implementation activities. The main air monitoring instrument needed at the Site is an organic vapor analyzer (OVA). If required, real-time monitoring and sampling with laboratory analysis will be performed. An Air Monitoring Plan, if required, will be prepared prior to the initiation of the remedy implementation activities at the Site.

Air monitoring measures that will be implemented at the Site will include, but will not be limited to, calibrating field monitoring and air sampling equipment, performing project documentation and air monitoring/sampling services during the excavation activities, performing air monitoring/sampling activities around the soil stockpiles, and performing air monitoring and/or sampling directly downwind to document the comparative air emission levels.

### 5.3.2 Mitigation of Emissions and Odors

Constituents in the soil can potentially migrate via air dispersion as dusts (particulates) or vapors. The requirements of the SCAQMD as well as the Site Health and Safety Plan should be met to control particulates and vapors that may be released during the implementation of Alternative 4b. The Site Health and Safety Plan will need to include the California Occupational Safety and Health (Cal OSHA) regulations governing air emissions monitoring for workplace safety A Dust and Odor Control Plan will be prepared prior to the initiation of construction activities at the Site.

Dust and odor control mitigation measures that will be implemented at the Site will include, but will not be limited to, minimizing soil disturbance/transfer, minimizing contaminated soil and waste exposure, and spraying work areas, excavated materials, and dirt roads with water, as necessary, until the surface is moist, and keeping in moist condition. If, at any time during the excavation procedures, elevated nuisance dust or odors occur, ENVIRON will cease the on-going activities immediately until the air emission source is mitigated and/or the air monitoring data support the resumption of field activities.

In addition to these measures, ENVIRON will implement vapor suppression measures if a distinct odor is detected at the Site boundary, will use long-duration VOC suppressants, plastic sheeting, geomembrane, and/or non-VOC-containing soil during non-working hours and when high dust and odor emissions are detected, and will brush dirt off all trucks before they leave the Site.

In addition to dust and odor control, unintentional release of emissions due to accidental fire at the Site should be controlled. Firefighting equipment and foam will be kept on-site at all times and ignition sources prohibited.

### 5.3.3 Storm Water Management

A Storm Water Pollution Prevention Plan (SWPPP) will be prepared. The SWPPP will include procedures and activities that are required to comply with the requirements of NPDES permit and State Water Resources Control Board, as applicable. Storm water management activities will include activities to keep all portions of the work free of standing water. This may require excavating ditches, if necessary, to drain the storm water runoff. If necessary, the storm water collected will be passed through the water treatment system that will be constructed at the Site. No storm water will be discharged from the Site without verification that it meets the requirements for discharge.

## 5.4 Conclusion

The presumptive FS concludes that when the preferred remedial alternative for the Site (i.e., Alternative 4b), which includes an *in situ* SVE system combined with limited excavation and on-site and *ex situ* SVE, is implemented, it will achieve the remedial objectives for the Site and eliminate or reduce to acceptable levels the identified risks from the soils. It will further provide a long-term, permanent solution for the Site and allow the property to be developed for future commercial or industrial use.

Prior to the full-scale implementation of this remedial measure, an SVE pilot test will be performed to evaluate the effectiveness of an SVE system in addressing the VOCs at the Site, the proper lateral spacing of the SVE wells (e.g., radius of influence), and the potential impact of the presence of the perched ground water to the operation of the SVE system. The SVE pilot test will be described in ENVIRON's RAP for the Site.

## 6.0 LIMITATIONS

This report was prepared exclusively for use by DISC, Respondents to the Consent Order, and Heller, Ehrman, White & McAuliffe, LLP, and may not be relied upon by any other person or entity without ENVIRON's express written permission. The conclusions presented in this report represent ENVIRON's professional judgment based on the information available to us during the course of this assignment and is true and correct to the best of ENVIRON's knowledge as of the date of the assignment. ENVIRON made reasonable efforts to verify the written and oral information provided in this report. Nevertheless, this report is accurate and complete only to the extent that information provided to ENVIRON was itself accurate and complete.

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# TABLES

## TABLE 2.1
## Chemicals Detected in Soil and Soil Gas
## 1550 N. Bonnie Beach Place
## Los Angeles, California

| Chemical | Environmental Media | |
|---|---|---|
| | Soil Gas | Surface Soil |
| **Volatile Organic Compounds (VOCs)** | | |
| Acetone | ND | X |
| Benzene | ND | X |
| Bromobenzene | ND | X |
| sec-Butylbenzene | ND | X |
| tert-Butylbenzene | ND | X |
| Chlorobenzene | ND | X |
| Chloroform | ND | X |
| 1,2-Dichlorobenzene | ND | X |
| 1,4-Dichlorobenzene | ND | X |
| 1,1-Dichloroethane | ND | X |
| 1,2-Dichloroethane | ND | X |
| 1,1-Dichloroethene | ND | X |
| cis-1,2-Dichloroethene | ND | X |
| trans-1,2-Dichloroethene | ND | X |
| Ethylbenzene | X | X |
| Freon 113 | X | X |
| 2-Hexanone | ND | X |
| Isopropylbenzene (Cumene) | ND | X |
| p-Isopropyltoluene (Cymene) | ND | X |
| Methyl Ethyl Ketone | ND | X |
| Methyl Isobutyl Ketone | ND | X |
| Methyl tertiary butyl ether (MTBE) | ND | X |
| Naphthalene | ND | X |
| n-Propylbenzene | ND | X |
| Styrene | ND | X |
| 1,1,1,2-Tetrachloroethane | ND | X |
| 1,1,2,2-Tetrachloroethane | ND | X |
| Tetrachloroethene | X | X |
| Toluene | X | X |
| 1,2,3-Trichlorobenzene | ND | X |
| 1,1,1-Trichloroethane | X | X |
| 1,1,2-Trichloroethane | ND | X |
| Trichloroethene | X | X |
| 1,2,4-Trimethylbenzene | X | X |
| 1,3,5-Trimethylbenzene | ND | X |
| Total Xylenes | X | X |
| Vinyl chloride | ND | X |

## TABLE 2.1
## Chemicals Detected in Soil and Soil Gas
## 1550 N. Bonnie Beach Place
## Los Angeles, California

| Chemical | Environmental Media | |
|---|---|---|
| | Soil Gas | Surface Soil |
| **Semi-Volatile Organic Compounds (SVOCs)** | | |
| bis(2-Ethylhexyl)phthalate | ---- | X |
| Butyl benzyl phthalate | ---- | X |
| **Polycyclic Aromatic Hydrocarbons (PAHs)** | | |
| Acenaphthylene | ---- | X |
| Benzo(g,h,i)perylene | ---- | X |
| Pyrene | ---- | X |
| **Pesticides** | | |
| alpha-BHC | ---- | X |
| Endrin | ---- | X |
| gamma-Hexachlorocyclohexane | ---- | X |
| Heptachlor epoxide | ---- | X |
| 4,4'-DDD | ---- | X |
| 4,4'-DDE | ---- | X |
| 4,4'-DDT | ---- | X |
| **Metals** | | |
| Barium | ---- | X |
| Chromium (Total) | ---- | X |
| Chromium (VI) | ---- | X |
| Cobalt | ---- | X |
| Copper | ---- | X |
| Lead | ---- | X |
| Mercury | ---- | X |
| Nickel | ---- | X |
| Vanadium | ---- | X |
| Zinc | ---- | X |

Notes:

---- = Not analyzed

ND = Not detected

X = Chemical detected

**TABLE 2.2**
**Intake Equation for Exposure Via Inhalation of Vapors**
**1550 N. Bonnie Beach Place**
**Los Angeles, California**

INHALATION INTAKE (VAPORS):

$$I_{vapors} = \frac{C \times BR \times TF \times CF \times ET \times EF \times ED}{BW \times AT}$$

| | | |
|---|---|---|
| $I_{vapors}$ | = | Inhalation Intake, milligrams per kilogram (mg/kg) body weight-day |
| C | = | Chemical Concentration, soil gas -- micrograms per cubic meter ($\mu g/m^3$); soil -- micrograms per kilogram ($\mu g/kg$) |
| BR | = | Breathing Rate, cubic meter ($m^3$)/hour |
| TF | = | Transfer Factor, soil gas ($\mu g/m^3$)/($\mu g/m^3$) or soil ($\mu$g/m3)/($\mu$g/kg) -- See Tables 4.11 and 4.12 |
| CF | = | Conversion Factor, 0.001 milligram per microgram (mg/$\mu$g) |
| ET | = | Exposure Time, hours/day |
| EF | = | Exposure Frequency, days/year |
| ED | = | Exposure Duration, years |
| BW | = | Body Weight, kilograms (kg) |
| AT | = | Averaging Time, days |

## TABLE 2.3
## Intake Equation for Exposure Via Inhalation of Windbown Soil Particulates
## 1550 N. Bonnie Beach Place
## Los Angeles, California

INHALATION INTAKE (PARTICULATES):

$$I_{part} = \frac{C \times BR \times TF \times CF \times ET \times EF \times ED}{BW \times AT}$$

| | | |
|---|---|---|
| $I_{part}$ | = | Inhalation Intake for Particulates, kilogram (kg) soil/kg body weight-day |
| C | = | Chemical Concentration, microgram per kilogram (μg/kg) |
| BR | = | Breathing Rate, cubic meter ($m^3$)/hour |
| TF | = | Transfer Factor (particulates), ($mg/m^3$)/(mg/kg) |
| CF | = | Conversion Factor, 0.001 milligram per microgram (mg/μg) |
| ET | = | Exposure Time, hours/day |
| EF | = | Exposure Frequency, days/year |
| ED | = | Exposure Duration, years |
| BW | = | Body weight, kg |
| AT | = | Averaging Time, days |

## TABLE 2.4
## Intake Equation for Exposure Via Incidental Ingestion of Soil
## 1550 N. Bonnie Beach Place
## Los Angeles, California

SOIL INGESTION INTAKE:

$$I_{ingestion} = \frac{C \times IR \times CF \times EF \times ED}{BW \times AT}$$

| | | |
|---|---|---|
| $I_{ingestion}$ | = | Ingestion Intake, kilogram (kg) soil/kg body weight-day |
| C | = | Chemical Concentration, milligram per kilogram (mg/kg) |
| IR | = | Ingestion Rate, mg/day |
| CF | = | Conversion Factor, kg/mg |
| EF | = | Exposure Frequency, days/year |
| ED | = | Exposure Duration, years |
| BW | = | Body weight, kg |
| AT | = | Averaging Time, days |

## TABLE 2.5
## Intake Equation for Exposure Via Dermal Contact with Soil
## 1550 N. Bonnie Beach Place
## Los Angeles, California

DERMAL INTAKE:

$$I_{dermal} = \frac{C \times SA \times AF \times ABS \times CF \times EF \times ED}{BW \times AT}$$

| | | |
|---|---|---|
| $I_{dermal}$ | = | Dermal Intake, kilogram (kg) soil/kg body weight-day |
| C | = | Chemical Concentration, milligram per kilogram (mg/kg) |
| SA | = | Surface Area of Exposed Skin, square centimeter ($cm^2$/day) |
| AF | = | Soil-to-Skin Adherence Factor, mg/$cm^2$ |
| ABS | = | Absorption Factor (unitless)[a] |
| CF | = | Conversion Factor, kg/mg |
| EF | = | Exposure Frequency, days/year |
| ED | = | Exposure Duration, years |
| BW | = | Body weight, kg |
| AT | = | Averaging Time, days |

Notes:

[a] Dermal absorption factors are presented in Table 2.7.

**TABLE 2.6**
**Exposure Assumptions**
**1550 N. Bonnie Beach Place**
**Los Angeles, California**

| Parameter | Commercial Worker | |
|---|---|---|
| | Indoor | Outdoor |
| **Inhalation of Vapors and Particulates** | | |
| Vapor Inhalation Rate ($m^3$/hour) | 2.5 [a] | 2.5 [a] |
| Exposure Time (hours/day) | 8 [b] | 8 [b] |
| Exposure Frequency (days/year) | 250 [a] | 250 [a] |
| Exposure Duration (years) | 25 [a] | 25 [a] |
| Transfer Factor - respirable dust (mg/$m^3$)/(mg/kg) | 1.00E-09 [c] | 1.00E-09 [c] |
| **Incidental Ingestion of Soil** | | |
| Ingestion Rate (mg/day) | 50 [a] | 50 [a] |
| Exposure Frequency (events/year) | 250 [a] | 250 [a] |
| Exposure Duration (years) | 25 [a] | 25 [a] |
| Conversion Factor (kg/mg) | 1.00E-06 | 1.00E-06 |
| **Dermal Contact with Soil** | | |
| Surface Area ($cm^2$/day) | 5,700 [d] | 5,700 [d] |
| Exposure Frequency (days/year) | 250 [d] | 250 [d] |
| Exposure Duration (years) | 25 [a] | 25 [a] |
| Adherence Factor (mg/$cm^2$) | 0.2 [d] | 0.2 [d] |
| Conversion Factor (kg/mg) | 1.00E-06 | 1.00E-06 |
| **Population-Specific** | | |
| Body Weight (kg) | 70 [e] | 70 [e] |
| Averaging Time - Carcinogens (days) | 25,550 | 25,550 |
| Averaging Time - Noncarcinogens (days) | 9,125 | 9,125 |

Notes:
$cm^2$ = square centimeter
kg = kilogram
$m^3$ = cubic meter
mg = milligram

[a] For commercial workers, a standard default of 20 $m^3$/day for an adult is assumed (Cal/EPA 1992)

[b] Future on-site commercial workers are assumed to work eight hours per day (USEPA 1991)

[c] Value derived using PEF equation presented in USEPA 2002 with the USEPA default dispersion coefficient for the Los Angeles area (68 81) from USEPA 1996

[d] Based on standard agency default assumptions (Cal/EPA 2000)

[e] Based on standard agency default assumptions (Cal/EPA 1992)

Sources:

California Environmental Protection Agency (Cal/EPA) 2000 *Guidance of the Dermal Exposure Pathway*. Memorandum to Human and Ecological Risk Division January 7 (Draft)

California Environmental Protection Agency (Cal/EPA). 1992 *Supplemental Guidance for Human Health* Multimedia Risk Assessments of Hazardous *Waste Sites and Permitted Facilities*. Department of Toxic Substances Control (DTSC). Sacramento, CA July

United States Environmental Protection Agency (USEPA) 1991. *Human Health Evaluation Manual, Supplemental Guidance*. "Standard Default *Exposure Factors*" OSWER Directive 9285.6-03. March 25

United States Environmental Protection Agency (USEPA) 2002. Region 9 PRGs Table 2002 Update October 1

## TABLE 2.7
## Dermal Absorption Fraction from Soil
## 1550 N. Bonnie Beach Place
## Los Angeles, California

| Chemical | Soil Absorption Factor (unitless) | Source |
|---|---|---|
| **Volatile Organic Compounds (VOCs)** | | |
| Acetone | 0 | a |
| Benzene | 0 | a |
| Bromobenzene | 0 | a |
| sec-Butylbenzene | 0 | a |
| tert-Butylbenzene | 0 | a |
| Chlorobenzene | 0 | a |
| Chloroform | 0 | a |
| 1,2-Dichlorobenzene | 0 | a |
| 1,4-Dichlorobenzene | 0 | a |
| 1,1-Dichloroethane | 0 | a |
| 1,2-Dichloroethane | 0 | a |
| 1,1-Dichloroethene | 0 | a |
| cis-1,2-Dichloroethene | 0 | a |
| trans-1,2-Dichloroethene | 0 | a |
| Ethylbenzene | 0 | a |
| Freon 113 | 0 | a |
| 2-Hexanone | 0 | a |
| Isopropylbenzene (Cumene) | 0 | a |
| p-Isopropyltoluene (Cymene) | 0 | a |
| Methyl Ethyl Ketone | 0 | a |
| Methyl Isobutyl Ketone | 0 | a |
| Methyl tertiary butyl ether (MTBE) | 0 | a |
| Naphthalene | 0 | a |
| n-Propylbenzene | 0 | a |
| Styrene | 0 | a |
| 1,1,1,2-Tetrachloroethane | 0 | a |
| 1,1,2,2-Tetrachloroethane | 0 | a |
| Tetrachloroethene | 0 | a |
| Toluene | 0 | a |
| 1,2,3-Trichlorobenzene | 0 | a |
| 1,1,1-Trichloroethane | 0 | a |
| 1,1,2-Trichloroethane | 0 | a |
| Trichloroethene | 0 | a |
| 1,2,4-Trimethylbenzene | 0 | a |
| 1,3,5-Trimethylbenzene | 0 | a |
| Total Xylenes | 0 | a |
| Vinyl chloride | 0 | a |
| **Semi-Volatile Organic Compounds (SVOCs)** | | |
| bis(2-Ethylhexyl)phthalate | 0.1 | a |
| Butyl benzyl phthalate | 0.1 | a |

## TABLE 2.7
## Dermal Absorption Fraction from Soil
## 1550 N. Bonnie Beach Place
## Los Angeles, California

| Chemical | Soil Absorption Factor (unitless) | Source |
|---|---|---|
| **Polycyclic Aromatic Hydrocarbons (PAHs)** | | |
| Acenaphthylene | 0.13 | a |
| Benzo(g,h,i)perylene | 0.13 | a |
| Pyrene | 0.13 | a |
| **Pesticides** | | |
| alpha-BHC | 0.04 | a |
| Endrin | 0.1 | a |
| gamma-Hexachlorocyclohexane | 0.04 | a |
| Heptachlor epoxide | 0.1 | a |
| 4,4'-DDD | 0.03 | a,b |
| 4,4'-DDE | 0.03 | a,b |
| 4,4'-DDT | 0.03 | a |
| **Metals** | | |
| Barium | 0 | a |
| Chromium (Total) | 0 | a |
| Chromium (VI) | 0 | a |
| Cobalt | 0 | a |
| Copper | 0 | a |
| Lead | 0 | a |
| Mercury | 0 | a |
| Nickel | 0 | a |
| Vanadium | 0 | a |
| Zinc | 0 | a |

Notes:
a USEPA 2001
b Value for DDT

Sources:

United States Environmental Protection Agency (USEPA) 2001 *Risk Assessment Guidance Superfund Volume I Human Health Evaluation Manual. Part E, Supplemental Gudiance Dermal Risk Assessment Interim* EPA/540/R/99/005. Washington, D.C. September.

## TABLE 2.8

## Calculated Intake Factors for Carcinogens and Noncarcinogens[a]
## 1550 N. Bonnie Beach Place
## Los Angeles, California

| Carcinogens | Potentially Exposed Populations | |
|---|---|---|
| | Commercial Worker | |
| **Exposure Scenario** | **Indoor** | **Outdoor** |
| Inhalation of Vapors ($m^3$/kg-day)[b] | 6.99E-02 | 6.99E-02 |
| Inhalation of Soil Particulates (kg/kg-day) | 7.00E-11 | 7.00E-11 |
| Ingestion of Soil - (kg/kg-day) | 1.75E-07 | 1.75E-07 |
| Dermal Contact with Soil (kg/kg-day)[c] | 3.98E-06 | 3.98E-06 |

| Noncarcinogens | Potentially Exposed Populations | |
|---|---|---|
| | Commercial Worker | |
| **Exposure Scenario** | **Indoor** | **Outdoor** |
| Inhalation of Vapors ($m^3$/kg-day)[b] | 1.96E-01 | 1.96E-01 |
| Inhalation of Soil Particulates (kg/kg-day) | 1.96E-10 | 1.96E-10 |
| Ingestion of Soil - (kg/kg-day) | 4.89E-07 | 4.89E-07 |
| Dermal Contact with Soil (kg/kg-day)[c] | 1.12E-05 | 1.12E-05 |

Notes:

$m^3$/kg-day = cubic meters air/kilogram body weight per day
kg/kg-day = kilograms soil/kilogram body weight per day

[a] The values listed in this table are media specific intake factors (i e., $m^3$ air / kg body weight per day or kg soil / kg body weight per day).

[b] To calculate chemical-specific soil gas and soil intake factors via inhalation, multiply listed value by chemical specific soil gas-to-air transfer or soil-to-air transfer coefficient listed in Tables 2.11 and 2.12, respectively. To calculate chemical-specific

[c] To calculate chemical-specific soil intake factors via dermal contact, multiply listed value by chemical specific dermal absorption fraction listed in Table 2.7.

## TABLE 2.9

**Physical/Chemical Properties[a]**
**1550 N. Bonnie Beach Place**
**Los Angeles, California**

| Chemical | Organic carbon partition coefficient, $K_{oc}$ ($cm^3/g$) | Diffusivity in air, $D_a$ ($cm^2/s$) | Diffusivity in water, $D_w$ ($cm^2/s$) | Henry's law constant at 25° C H' (unitless) | Henry's law constant at 25° C H ($atm\text{-}m^3/mol$) | Pure component water solubility, S (mg/L) | Normal boiling point, $T_B$ ($^oK$) | Critical temperature, $T_C$ ($^oK$) | Enthalpy of vaporization at the normal boiling point, ? $H_{v,b}$ (cal/mol) |
|---|---|---|---|---|---|---|---|---|---|
| Acetone | 5.75E-01 | 1.24E-01 | 1.14E-05 | 1.59E-03 | 3.87E-05 | 1.00E+06 | 3.29E+02 | 5.08E+02 | 6.96E+03 |
| Benzene | 5.89E+01 | 8.80E-02 | 9.80E-06 | 2.27E-01 | 5.54E-03 | 1.79E+03 | 3.53E+02 | 5.62E+02 | 7.34E+03 |
| Bromobenzene | 2.19E+02 | 7.30E-02 | 8.70E-06 | 1.51E-01 | 3.69E-03 | 4.72E+02 | 4.05E+02 | 6.32E+02 | 8.41E+03 |
| sec-Butylbenzene | 9.66E+02 | 5.70E-02 | 8.12E-06 | 5.68E-01 | 1.39E-02 | 3.94E+00 | 4.47E+02 | 6.79E+02 | 8.87E+04 |
| tert-Butylbenzene | 7.71E+02 | 5.65E-02 | 8.02E-06 | 4.87E-01 | 1.19E-02 | 2.95E+01 | 4.42E+02 | 1.22E+03 | 8.98E+03 |
| Chlorobenzene | 2.19E+02 | 7.30E-02 | 8.70E-06 | 1.51E-01 | 3.69E-03 | 4.72E+02 | 4.05E+02 | 6.32E+02 | 8.41E+03 |
| Chloroform | 3.98E+01 | 1.04E-01 | 1.00E-05 | 1.50E-01 | 3.66E-03 | 7.92E+03 | 3.34E+02 | 5.36E+02 | 6.99E+03 |
| 1,2-Dichlorobenzene | 6.17E+02 | 6.90E-02 | 7.90E-06 | 7.77E-02 | 1.90E-03 | 1.56E+02 | 4.54E+02 | 7.05E+02 | 9.70E+03 |
| 1,4-Dichlorobenzene | 6.17E+02 | 6.90E-02 | 7.90E-06 | 9.82E-02 | 2.39E-03 | 7.90E+01 | 4.47E+02 | 6.85E+02 | 9.27E+03 |
| 1,1-Dichloroethane | 3.16E+01 | 7.42E-02 | 1.05E-05 | 2.30E-01 | 5.61E-03 | 5.06E+03 | 3.31E+02 | 5.23E+02 | 6.90E+03 |
| 1,2-Dichloroethane | 1.74E+01 | 1.04E-01 | 9.90E-06 | 4.00E-02 | 9.77E-04 | 8.52E+03 | 3.57E+02 | 5.61E+02 | 7.64E+03 |
| 1,1-Dichloroethene | 5.89E+01 | 9.00E-02 | 1.04E-05 | 1.07E+00 | 2.60E-02 | 2.25E+03 | 3.05E+02 | 5.76E+02 | 6.25E+03 |
| cis-1,2-Dichloroethene | 3.55E+01 | 7.36E-02 | 1.13E-05 | 1.67E-01 | 4.07E-03 | 3.50E+03 | 3.34E+02 | 5.44E+02 | 7.19E+03 |
| trans-1,2-Dichloroethene | 5.25E+01 | 7.07E-02 | 1.19E-05 | 3.84E-01 | 9.36E-03 | 6.30E+03 | 3.21E+02 | 5.17E+02 | 6.72E+03 |
| Ethylbenzene | 3.63E+02 | 7.50E-02 | 7.80E-06 | 3.22E-01 | 7.86E-03 | 1.69E+02 | 4.09E+02 | 6.17E+02 | 8.50E+03 |
| Freon 113 | 1.11E+04 | 7.80E-02 | 8.20E-06 | 1.97E+01 | 4.80E-01 | 1.70E+02 | 3.21E+02 | 4.87E+02 | 6.46E+03 |
| 2-Hexanone | 1.30E+01 | 8.08E-02 | 9.80E-02 | 3.81E-03 | 9.16E-05 | 1.75E+04 | 4.01E+02 | 1.00E+00 | 0.00E+00 |
| Isopropylbenzene (Cumene) | 4.89E+02 | 6.50E-02 | 7.10E-06 | 4.74E+01 | 1.16E+00 | 6.13E+01 | 4.26E+02 | 6.31E+02 | 1.03E+04 |
| p-Isopropyltoluene (Cymene) | 1.32E+03 | 5.69E-02 | 7.33E-06 | 4.51E-01 | 1.10E-02 | 2.34E+01 | 4.50E+02 | 6.52E+02 | 0.00E+00 |
| Methyl Ethyl Ketone | 2.30E+00 | 8.08E-02 | 9.80E-06 | 2.29E-03 | 5.58E-05 | 2.23E+05 | 3.53E+02 | 5.37E+02 | 7.48E+03 |
| Methyl Isobutyl Ketone | 9.06E+00 | 7.50E-02 | 7.80E-06 | 5.64E-03 | 1.38E-04 | 1.90E+04 | 3.90E+02 | 5.71E+02 | 8.24E+03 |
| Methyl tertiary butyl ether (MTBE) | 7.26E+00 | 1.02E-01 | 1.05E-05 | 2.56E-02 | 6.23E-04 | 5.10E+04 | 3.28E+02 | 4.97E+02 | 6.68E+03 |
| Naphthalene | 2.00E+03 | 5.90E-02 | 7.50E-06 | 1.98E-02 | 4.82E-04 | 3.10E+01 | 4.91E+02 | 7.48E+02 | 1.04E+04 |
| n-Propylbenzene | 5.62E+02 | 6.01E-02 | 7.83E-06 | 4.37E-01 | 1.07E-02 | 6.00E+01 | 4.32E+02 | 6.30E+02 | 9.12E+03 |
| Styrene | 7.76E+02 | 7.10E-02 | 8.00E-06 | 1.12E-01 | 2.74E-03 | 3.10E+02 | 4.18E+02 | 6.36E+02 | 8.74E+03 |
| 1,1,1,2-Tetrachloroethane | 1.16E+02 | 7.10E-02 | 7.90E-06 | 9.90E-02 | 2.41E-03 | 1.10E+03 | 4.04E+02 | 6.24E+02 | 9.77E+03 |

## TABLE 2.9

**Physical/Chemical Properties[a]**
**1550 N. Bonnie Beach Place**
**Los Angeles, California**

| Chemical | Organic carbon partition coefficient, $K_{oc}$ ($cm^3/g$) | Diffusivity in air, $D_a$ ($cm^2/s$) | Diffusivity in water, $D_w$ ($cm^2/s$) | Henry's law constant at 25° C H' (unitless) | Henry's law constant at 25° C H ($atm\text{-}m^3/mol$) | Pure component water solubility, S (mg/L) | Normal boiling point, $T_B$ (°K) | Critical temperature, $T_C$ (°K) | Enthalpy of vaporization at the normal boiling point, ?$H_{v,b}$ (cal/mol) |
|---|---|---|---|---|---|---|---|---|---|
| 1,1,2,2-Tetrachloroethane | 9.33E+01 | 7.10E-02 | 7.90E-06 | 1.41E-02 | 3.44E-04 | 2.96E+03 | 4.20E+02 | 6.61E+02 | 9.00E+03 |
| Tetrachloroethene | 1.55E+02 | 7.20E-02 | 8.20E-06 | 7.53E-01 | 1.84E-02 | 2.00E+02 | 3.94E+02 | 6.20E+02 | 8.29E+03 |
| Toluene | 1.82E+02 | 8.70E-02 | 8.60E-06 | 2.72E-01 | 6.62E-03 | 5.26E+02 | 3.84E+02 | 5.92E+02 | 7.93E+03 |
| 1,2,3-Trichlorobenzene | 7.41E+03 | 3.00E-02 | 8.23E-06 | 3.65E-01 | 8.90E-03 | 1.80E+01 | 4.86E+02 | 7.25E+02 | 1.05E+04 |
| 1,1,1-Trichloroethane | 1.10E+02 | 7.80E-02 | 8.80E-06 | 7.03E-01 | 1.72E-02 | 1.33E+03 | 3.47E+02 | 5.45E+02 | 7.14E+03 |
| 1,1,2-Trichloroethane | 5.01E+01 | 7.80E-02 | 8.80E-06 | 3.73E-02 | 9.11E-04 | 4.42E+03 | 3.86E+02 | 6.02E+02 | 8.32E+03 |
| Trichloroethene | 1.66E+02 | 7.90E-02 | 9.10E-06 | 4.21E-01 | 1.03E-02 | 1.47E+03 | 3.60E+02 | 5.44E+02 | 7.51E+03 |
| 1,2,4-Trimethylbenzene | 1.35E+03 | 6.06E-02 | 7.92E-06 | 2.52E-01 | 6.14E-03 | 5.70E+01 | 4.42E+02 | 6.49E+02 | 9.37E+03 |
| 1,3,5-Trimethylbenzene | 1.35E+03 | 6.02E-02 | 8.67E-06 | 2.41E-01 | 5.87E-03 | 2.00E+00 | 4.38E+02 | 6.37E+02 | 9.32E+03 |
| Total Xylenes | 3.89E+02 | 7.69E-02 | 8.44E-06 | 3.13E-01 | 7.64E-03 | 1.85E+02 | 4.12E+02 | 6.16E+02 | 8.53E+03 |
| Vinyl chloride | 1.86E+01 | 1.06E-01 | 1.23E-05 | 1.10E+00 | 2.69E-02 | 8.80E+03 | 2.59E+02 | 4.32E+02 | 5.25E+03 |

Notes:

$atm\text{-}m^3/mol$ = atmosphere-cubic meter per mole
$cm^3/g$ = cubic centimeter/gram
$cm^2/s$ = square centimeter/second
mg/L = milligrams per liter
°K = degrees Kelvin
cal/mol = calories per mole

[a] Unless noted otherwise, all properties for all chemicals are from USEPA (2000)

Sources:

United States Environmental Protection Agency (USEPA). 2000. User's Guide for the Johnson and Ettinger (1991) Model for Subsurface Vapor Intrustion into Buildings (Revised). Prepared by Environmental Quality Management, Inc. December.

## TABLE 2.10
## Vapor Modeling Parameters for Indoor and Outdoor Commercial Workers
## 1550 N. Bonnie Beach Place
## Los Angeles, California

| Parameters | Value | Units | Note/Source |
|---|---|---|---|
| **General** | | | |
| Depth interval of impacted soil | 0.5-40.5 | feet | Site-specific, based on depths of soil detections |
| Depth to soil gas measurement | 5 | feet | Site-specific, based on depths of soil gas measurements |
| Soil dry bulk density | 1.69 | $g/cm^3$ | Site-specific, based on SB7-2.0-2.5 |
| Soil total porosity | 0.359 | - | Site-specific, based on SB7-2.0-2.5 |
| Soil water-filled porosity | 0.3092 | - | Site-specific, based on SB7-2.0-2.5 moisture content |
| Soil fraction organic carbon | 0.00475 | - | Site-specific, based on SB7-2.0-2.5 |
| Soil temperature | 20 | deg C | Region-specific, based on USEPA 2003 |
| **Indoor: Default Commercial Building** | | | |
| Soil type under building foundation | Sand | - | Assumption based on future construction of foundation |
| Enclosed-space floor thickness | 15 | cm | Conservative estimate |
| Soil-building pressure differential | 40 | $g/cm\text{-}s^2$ | Recommended default (USEPA 2003) |
| Enclosed space floor length | 32.8 | feet | Recommended default (USEPA 2003) |
| Enclosed space floor width | 32.8 | feet | Recommended default (USEPA 2003) |
| Enclosed space height | 10 | feet | Conservative estimate |
| Floor-wall seam crack width | 0.1 | cm | Recommended default (USEPA 2003) |
| Indoor air exchange rate, commercial | 0.83 | 1/hour | Recommended default (ASTM 1995) |
| **Outdoor** | | | |
| Meteorologic Dispersion Term (Q/C) | 68 81 | $g/m^2$-s per $kg/m^3$ | Value for 0.5 acre source in Los Angeles (USEPA 1996) |

Notes:
cm = centimeter
deg C = degrees Celsius
$g/cm^3$ = grams per cubic centimeter
$g/cm\text{-}s^2$ = grams per centimeter-square second

Sources:
American Society for Test and Materials (ASTM). 1995. *Standard Guide for Risk-Based Corrective Action Applied at Petroleum Release Sites* Philadelphia, PA
United States Environmental Protection Agency (USEPA) 2003 *User's Guide for Evaluating Subsurface Vapor Intrusion into Buildings* Prepared by Environmental Quality Management, Inc Office of Emergency and Remedial Response June 19
United States Environmental Protection Agency (USEPA) 1996 Soil Screening Guidance: User's Guide Office of Solid Waste and Emergency Response Publication 9355 4-23 July

**TABLE 2.11**
**Soil Gas-to-Air Transfer Factors (5 feet below ground surface)**
**1550 N. Bonnie Beach Place**
**Los Angeles, California**

| Chemical | Soil Gas-to-Air Transfer Factors ($\mu g/m^3$)/($\mu g/m^3$) | |
|---|---|---|
| | **Indoor Commercial Worker** | **Outdoor Commercial Worker** |
| **Volatile Organic Compounds (VOCs)** | | |
| Acetone | 4.92E-05 | 1.35E-06 |
| Benzene | 3.53E-06 | 3.77E-08 |
| Bromobenzene | 3.36E-06 | 3.58E-08 |
| sec-Butylbenzene | 5.88E-06 | 6.49E-08 |
| tert-Butylbenzene | 2.12E-06 | 2.23E-08 |
| Chlorobenzene | 3.36E-06 | 3.58E-08 |
| Chloroform | 4.37E-06 | 4.73E-08 |
| 1,2-Dichlorobenzene | 4.09E-06 | 4.41E-08 |
| 1,4-Dichlorobenzene | 3.69E-06 | 3.96E-08 |
| 1,1-Dichloroethane | 3.14E-06 | 3.33E-08 |
| 1,2-Dichloroethane | 7.23E-06 | 8.13E-08 |
| 1,1-Dichloroethene | 3.03E-06 | 3.21E-08 |
| cis-1,2-Dichloroethene | 3.48E-06 | 3.72E-08 |
| trans-1,2-Dichloroethene | 2.78E-06 | 2.95E-08 |
| Ethylbenzene | 2.84E-06 | 3.01E-08 |
| Freon 113 | 2.51E-06 | 2.64E-08 |
| 2-Hexanone | 1.61E-03 | 3.82E-03 |
| Isopropylbenzene (Cumene) | 2.10E-06 | 2.20E-08 |
| p-Isopropyltoluene (Cymene) | 2.06E-06 | 2.16E-08 |
| Methyl Ethyl Ketone | 3.98E-05 | 8.25E-07 |
| Methyl Isobutyl Ketone | 2.10E-05 | 2.93E-07 |
| Methyl tertiary butyl ether (MTBE) | 9.37E-06 | 1.09E-07 |
| Naphthalene | 8.74E-06 | 1.00E-07 |
| n-Propylbenzene | 2.28E-06 | 2.39E-08 |
| Styrene | 3.56E-06 | 3.80E-08 |
| 1,1,1,2-Tetrachloroethane | 3.75E-06 | 4.02E-08 |
| 1,1,2,2-Tetrachloroethane | 1.13E-05 | 1.35E-07 |
| Tetrachloroethene | 2.51E-06 | 2.64E-08 |

**TABLE 2.11**
**Soil Gas-to-Air Transfer Factors (5 feet below ground surface)**
**1550 N. Bonnie Beach Place**
**Los Angeles, California**

| Chemical | Soil Gas-to-Air Transfer Factors ($\mu g/m^3$)/($\mu g/m^3$) | |
|---|---|---|
| | Indoor Commercial Worker | Outdoor Commercial Worker |
| Toluene | 3.32E-06 | 3.54E-08 |
| 1,2,3-Trichlorobenzene | 1.44E-06 | 1.50E-08 |
| 1,1,1-Trichloroethane | 2.71E-06 | 2.87E-08 |
| 1,1,2-Trichloroethane | 6.45E-06 | 7.17E-08 |
| Trichloroethene | 2.90E-06 | 3.07E-08 |
| 1,2,4-Trimethylbenzene | 2.55E-06 | 2.69E-08 |
| 1,3,5-Trimethylbenzene | 2.62E-06 | 2.77E-08 |
| Total Xylenes | 2.95E-06 | 3.13E-08 |
| Vinyl chloride | 3.53E-06 | 3.77E-08 |

Notes:
$\mu g/m^3$ = micrograms per cubic meter

# TABLE 2.12
## Soil-to-Air Transfer Factors
## 1550 N. Bonnie Beach Place
## Los Angeles, California

| Chemical | Soil-to-Air Transfer Factors ($\mu g/m^3$)/($\mu g/kg$) | |
|---|---|---|
| | Indoor Commercial Worker | Outdoor Commercial Worker |
| **Volatile Organic Compounds (VOCs)** | | |
| Acetone | 5.29E-04 | 2.96E-05 |
| Benzene | 3.42E-03 | 3.71E-05 |
| Bromobenzene | 4.10E-03 | 4.39E-05 |
| sec-Butylbenzene | 2.42E-03 | 2.83E-05 |
| tert-Butylbenzene | 5.87E-03 | 6.13E-05 |
| Chlorobenzene | 4.10E-03 | 4.39E-05 |
| Chloroform | 3.46E-03 | 3.80E-05 |
| 1,2-Dichlorobenzene | 3.09E-03 | 3.41E-05 |
| 1,4-Dichlorobenzene | 3.35E-03 | 3.65E-05 |
| 1,1-Dichloroethane | 3.89E-03 | 4.17E-05 |
| 1,2-Dichloroethane | 2.97E-03 | 3.48E-05 |
| 1,1-Dichloroethene | 7.13E-03 | 7.47E-05 |
| cis-1,2-Dichloroethene | 4.53E-03 | 4.84E-05 |
| trans-1,2-Dichloroethene | 6.21E-03 | 6.51E-05 |
| Ethylbenzene | 5.51E-03 | 5.80E-05 |
| Freon 113 | 2.53E-03 | 2.74E-05 |
| 2-Hexanone | 3.07E-02 | 3.80E-04 |
| Isopropylbenzene (Cumene) | 2.36E-02 | 2.43E-04 |
| p-Isopropyltoluene (Cymene) | 6.36E-03 | 6.62E-05 |
| Methyl Ethyl Ketone | 6.85E-04 | 2.68E-05 |
| Methyl Isobutyl Ketone | 1.24E-03 | 2.43E-05 |
| Methyl tertiary butyl ether (MTBE) | 2.64E-03 | 3.27E-05 |
| Naphthalene | 1.98E-03 | 2.55E-05 |
| n-Propylbenzene | 5.63E-03 | 5.89E-05 |
| Styrene | 3.58E-03 | 3.87E-05 |
| 1,1,1,2-Tetrachloroethane | 3.38E-03 | 3.68E-05 |
| 1,1,2,2-Tetrachloroethane | 1.87E-03 | 2.58E-05 |
| Tetrachloroethene | 7.87E-03 | 8.19E-05 |
| Toluene | 5.55E-03 | 5.87E-05 |
| 1,2,3-Trichlorobenzene | 3.98E-03 | 4.15E-05 |
| 1,1,1-Trichloroethane | 4.35E-03 | 4.60E-05 |
| 1,1,2-Trichloroethane | 1.71E-03 | 2.13E-05 |
| Trichloroethene | 2.89E-03 | 3.13E-05 |
| 1,2,4-Trimethylbenzene | 4.51E-03 | 4.76E-05 |
| 1,3,5-Trimethylbenzene | 4.47E-03 | 4.72E-05 |
| Total Xylenes | 5.53E-03 | 5.83E-05 |
| Vinyl chloride | 1.03E-02 | 1.07E-04 |

Notes:

$\mu g/m^3$ = micrograms per cubic meter

$\mu g/kg$ = micrograms per kilogram

**TABLE 2.13**
**Cancer Toxicity Values**
**1550 N. Bonnie Beach Place**
**Los Angeles, California**

| Chemical | Cancer Slope Factor (CSF) (mg/kg-day)$^{-1}$ Inhalation | Oral | Source | Unit Risk Factor (URF) ($\mu g/m^3$)$^{-1}$ URF | Source | USEPA Weight of Evidence |
|---|---|---|---|---|---|---|
| **Volatile Organic Compounds (VOCs)** | | | | | | |
| Acetone | ---- | ---- | | ---- | | D |
| Benzene | 1.00E-01 | 1.00E-01 | Cal/EPA 2003 | 2.90E-05 | Cal/EPA 2003 | A |
| Bromobenzene | ---- | ---- | | ---- | | ---- |
| sec-Butylbenzene | ---- | ---- | | ---- | | ---- |
| tert-Butylbenzene | ---- | ---- | | ---- | | ---- |
| Chlorobenzene | ---- | ---- | | ---- | | D |
| Chloroform | 1.90E-02 | 3.10E-02 | Cal/EPA 2003 | 5.30E-06 | Cal/EPA 2003 | B2 |
| 1,2-Dichlorobenzene | ---- | ---- | | ---- | | D |
| 1,4-Dichlorobenzene | 4.00E-02 | 5.40E-03 | Cal/EPA 2003 | 1.10E-05 | Cal/EPA 2003 | ---- |
| 1,1-Dichloroethane | 5.70E-03 | 5.70E-03 | Cal/EPA 2003 | 1.60E-06 | Cal/EPA 2003 | C |
| 1,2-Dichloroethane | 7.20E-02 | 4.70E-02 | Cal/EPA 2003 | 2.10E-05 | Cal/EPA 2003 | B2 |
| 1,1-Dichloroethene | ---- | ---- | | ---- | | C |
| cis-1,2-Dichloroethene | ---- | ---- | | ---- | | D |
| trans-1,2-Dichloroethene | ---- | ---- | | ---- | | ---- |
| Ethylbenzene | ---- | ---- | | ---- | | D |
| Freon 113 | ---- | ---- | | ---- | | ---- |
| 2-Hexanone | ---- | ---- | | ---- | | ---- |
| Isopropylbenzene (Cumene) | ---- | ---- | | ---- | | D |
| p-Isopropyltoluene (Cymene) | ---- | ---- | | ---- | | ---- |
| Methyl Ethyl Ketone | ---- | ---- | | ---- | | ---- |
| Methyl Isobutyl Ketone | ---- | ---- | | ---- | | ---- |
| Methyl tertiary butyl ether (MTBE)[a] | 9.10E-04 | 1.80E-03 | Cal/EPA 2003 | 2.60E-07 | Cal/EPA 2003 | ---- |
| Naphthalene | ---- | ---- | | ---- | | C |
| n-Propylbenzene | ---- | ---- | | ---- | | ---- |
| Styrene | ---- | ---- | | ---- | | ---- |
| 1,1,1,2-Tetrachloroethane | 2.60E-02 | 2.60E-02 | IRIS | 7.40E-06 | IRIS | C |
| 1,1,2,2-Tetrachloroethane | 2.00E-01 | 2.70E-01 | Cal/EPA 2003 | 5.80E-05 | Cal/EPA 2003 | C |
| Tetrachloroethene | 2.10E-02 | 5.40E-01 | Cal/EPA 2003 | 5.90E-06 | Cal/EPA 2003 | ---- |
| Toluene | ---- | ---- | | ---- | | D |
| 1,2,3-Trichlorobenzene | ---- | ---- | | ---- | | ---- |
| 1,1,1-Trichloroethane | ---- | ---- | | ---- | | D |
| 1,1,2-Trichloroethane | 5.70E-02 | 7.20E-02 | Cal/EPA 2003 | 1.60E-05 | Cal/EPA 2003 | C |
| Trichloroethene | 7.00E-03 | 1.30E-02 | Cal/EPA 2003 | 2.00E-06 | Cal/EPA 2003 | ---- |
| 1,2,4-Trimethylbenzene | ---- | ---- | | ---- | | ---- |
| 1,3,5-Trimethylbenzene | ---- | ---- | | ---- | | ---- |
| m,p-Xylene | ---- | ---- | | ---- | | D |
| o-Xylene | ---- | ---- | | ---- | | D |
| Total Xylenes | ---- | ---- | | ---- | | D |
| Vinyl chloride | 2.70E-01 | 2.70E-01 | Cal/EPA 2003 | 7.80E-05 | Cal/EPA 2003 | ---- |
| **Semi-Volatile Organic Compounds (SVOCs)** | | | | | | |
| bis(2-Ethylhexyl)phthalate | 8.40E-03 | 3.00E-03 | Cal/EPA 2003 | 2.40E-06 | Cal/EPA 2003 | B2 |
| Butyl benzyl phthalate | ---- | ---- | | ---- | | C |
| **Polycyclic Aromatic Hydrocarbons (PAHs)** | | | | | | |
| Acenaphthylene | ---- | ---- | | ---- | | D |
| Benzo(g,h,i)perylene | ---- | ---- | | ---- | | D |
| Pyrene | ---- | ---- | | ---- | | D |
| **Pesticides** | | | | | | |
| alpha-BHC | 2.70E+00 | 2.70E+00 | Cal/EPA 2003 | 7.70E-04 | Cal/EPA 2003 | B2 |
| Endrin | ---- | ---- | | ---- | | D |
| gamma-Hexachlorocyclohexane | 1.10E+00 | 1.10E+00 | Cal/EPA 2003 | 3.10E-04 | Cal/EPA 2003 | ---- |
| Heptachlor epoxide | 5.50E+00 | 5.50E+00 | Cal/EPA 2003 | ---- | | B2 |
| 4,4'-DDD | 2.40E-01 | 2.40E-01 | Cal/EPA 2003 | 6.90E-05 | Cal/EPA 2003 | B2 |
| 4,4'-DDE | 3.40E-01 | 3.40E-01 | Cal/EPA 2003 | 9.70E-05 | Cal/EPA 2003 | B2 |
| 4,4'-DDT | 3.40E-01 | 3.40E-01 | Cal/EPA 2003 | 9.70E-05 | Cal/EPA 2003 | B2 |

## TABLE 2.13
## Cancer Toxicity Values
## 1550 N. Bonnie Beach Place
## Los Angeles, California

| Chemical | Cancer Slope Factor (CSF) (mg/kg-day)$^{-1}$ | | | Unit Risk Factor (URF) ($\mu g/m^3$)$^{-1}$ | | USEPA Weight of Evidence |
|---|---|---|---|---|---|---|
| | Inhalation | Oral | Source | URF | Source | |
| **Metals** | | | | | | |
| Barium | ---- | ---- | | ---- | | D |
| Chromium (Total) | 4.20E+01 | ---- | Region 9 PRGs | ---- | | ---- |
| Chromium (VI) | 5.10E+02 | ---- | Cal/EPA 2003 (b) | 1.50E-01 | Cal/EPA 2003 | A (inh); D (oral) |
| Cobalt | 9.80E+00 | ---- | NCEA | 2.80E-03 | NCEA | ---- |
| Copper | ---- | ---- | | ---- | | D |
| Lead | ---- | ---- | | ---- | | B2 |
| Mercury | ---- | ---- | | ---- | | D |
| Nickel | 9.10E-01 | ---- | Cal/EPA 2003 (b) | 2.60E-04 | Cal/EPA 2003 | A |
| Vanadium | ---- | ---- | | ---- | | ---- |
| Zinc | ---- | ---- | | ---- | | D |

Notes:
Cal/EPA = California Environmental Protection Agency
IRIS = Integrated Risk Information System
NCEA = National Center for Environmental Assessment
USEPA = United States Environmental Protection Agency

mg/kg-day = milogram/kilogram-day
$\mu g/m^3$ = microgram/cubic meter

[a] Cal/EPA has published an oral and inhalation cancer slope factor for MTBE The CalEPA study did not find data on the long-term effects of human exposure to MTBE relevant to cancer, but did conclude there was a statistically significant increase in lymphoma and leukemia in rats that ingested MTBE USEPA has not classified MTBE as a human carcinogen

[b] This chemical is not a known carcinogen via the oral route

Sources:

California Environmental Protection Agency (Cal/EPA) 2003. *California Cancer Potency Values* Office of Environmental Health Hazard Assessment September

National Center for Environmental Assessment (NCEA) 2002. Cited in USEPA Region 9 Preliminary Remediation Goals (PRGs) 2002. San Francisco, CA October 1

United States Environmental Protection Agency (USEPA) 2004 *Integrated risk information system (IRIS)* Online database maintained by the USEPA Cincinnati, OH January

## TABLE 2.14
## Chronic Noncancer Toxicity Values
## 1550 N. Bonnie Beach Place
## Los Angeles, California

| Chemical | Noncancer Reference Dose (RfD) (mg/kg-day) | | | |
|---|---|---|---|---|
| | Inhalation | Source | Oral | Source |
| **Volatile Organic Compounds (VOCs)** | | | | |
| Acetone | 9.00E-01 | a | 9.00E-01 | IRIS |
| Benzene | 1.71E-02 | Cal/EPA 2003 | 3.00E-03 | NCEA |
| Bromobenzene | 2.90E-03 | NCEA | 2.00E-02 | NCEA |
| sec-Butylbenzene | 4.00E-02 | a | 4.00E-02 | NCEA |
| tert-Butylbenzene | 4.00E-02 | a | 4.00E-02 | NCEA |
| Chlorobenzene | 2.86E-01 | Cal/EPA 2003 | 2.00E-02 | IRIS |
| Chloroform | 8.57E-02 | Cal/EPA 2003 | 1.00E-02 | IRIS |
| 1,2-Dichlorobenzene | 5.71E-02 | HEAST | 9.00E-02 | IRIS |
| 1,4-Dichlorobenzene | 2.29E-01 | Cal/EPA 2003 | 3.00E-02 | NCEA |
| 1,1-Dichloroethane | 1.40E-01 | HEAST | 1.00E-01 | HEAST |
| 1,2-Dichloroethane | 1.14E-01 | Cal/EPA 2003 | 3.00E-02 | NCEA |
| 1,1-Dichloroethene | 2.00E-02 | Cal/EPA 2003 | 5.00E-02 | IRIS |
| cis-1,2-Dichloroethene | 1.00E-02 | a | 1.00E-02 | HEAST |
| trans-1,2-Dichloroethene | 2.00E-02 | a | 2.00E-02 | IRIS |
| Ethylbenzene | 5.71E-01 | Cal/EPA 2003 | 1.00E-01 | IRIS |
| Freon 113 | 8.60E+00 | HEAST | 3.00E+01 | IRIS |
| 2-Hexanone | 2.30E-02 | b | 8.00E-02 | b |
| Isopropylbenzene (Cumene) | 1.10E-01 | IRIS | 1.00E-01 | IRIS |
| p-Isopropyltoluene (Cymene) | 1.10E-01 | c | 1.00E-01 | c |
| Methyl Ethyl Ketone | 1.43E+00 | IRIS | 6.00E-01 | IRIS |
| Methyl Isobutyl Ketone | 2.30E-02 | HEAST | 8.00E-02 | HEAST |
| Methyl tertiary butyl ether (MTBE) | 2.29E+00 | Cal/EPA 2003 | 3.00E-02 | USEPA 1999 |
| Naphthalene | 2.57E-03 | Cal/EPA 2003 | 2.00E-02 | IRIS |
| n-Propylbenzene | 4.00E-02 | a | 4.00E-02 | NCEA |
| Styrene | 2.57E-01 | Cal/EPA 2003 | 2.00E-01 | IRIS |
| 1,1,1,2-Tetrachloroethane | 3.00E-02 | a | 3.00E-02 | IRIS |
| 1,1,2,2-Tetrachloroethane | 6.00E-02 | a | 6.00E-02 | NCEA |
| Tetrachloroethene | 1.00E-02 | Cal/EPA 2003 | 1.70E-01 | NCEA |
| Toluene | 8.57E-02 | Cal/EPA 2003 | 2.00E-01 | IRIS |
| 1,2,3-Trichlorobenzene | 5.70E-02 | HEAST (d) | 1.00E-02 | IRIS (d) |
| 1,1,1-Trichloroethane | 2.86E-01 | Cal/EPA 2003 | 2.80E-01 | NCEA |
| 1,1,2-Trichloroethane | 4.00E-03 | a | 4.00E-03 | IRIS |
| Trichloroethene | 1.71E-01 | Cal/EPA 2003 | 1.00E-02 | NCEA |
| 1,2,4-Trimethylbenzene | 1.70E-03 | NCEA | 5.00E-02 | NCEA |
| 1,3,5-Trimethylbenzene | 1.70E-03 | NCEA | 5.00E-02 | NCEA |
| Total Xylenes | 2.00E-01 | Cal/EPA 2003 | 2.00E-01 | IRIS |
| Vinyl chloride | 2.90E-02 | IRIS | 3.00E-03 | IRIS |
| **Semi-Volatile Organic Compounds (SVOCs)** | | | | |
| bis(2-Ethylhexyl)phthalate | 2.00E-02 | a | 2.00E-02 | IRIS |
| Butyl benzyl phthalate | 2.00E-01 | a | 2.00E-01 | IRIS |
| **Polycyclic Aromatic Hydrocarbons (PAHs)** | | | | |
| Acenaphthylene | 2.57E-03 | Cal/EPA 2003 (e) | 2.00E-02 | IRIS (e) |
| Benzo(g,h,i)perylene | 2.57E-03 | Cal/EPA 2003 (e) | 2.00E-02 | IRIS (e) |
| Pyrene | 3.00E-02 | a | 3.00E-02 | IRIS |

## TABLE 2.14
## Chronic Noncancer Toxicity Values
## 1550 N. Bonnie Beach Place
## Los Angeles, California

| Chemical | Noncancer Reference Dose (RfD) (mg/kg-day) | | | |
|---|---|---|---|---|
| | Inhalation | Source | Oral | Source |
| **Pesticides** | | | | |
| alpha-BHC | 5.00E-04 | a | 5.00E-04 | NCEA |
| Endrin | 3.00E-04 | a | 3.00E-04 | IRIS |
| gamma-Hexachlorocyclohexane | 3.00E-04 | a | 3.00E-04 | IRIS |
| Heptachlor epoxide | 1.30E-05 | a | 1.30E-05 | IRIS |
| 4,4'-DDD | ---- | | ---- | |
| 4,4'-DDE | ---- | | ---- | |
| 4,4'-DDT | 5.00E-04 | a | 5.00E-04 | IRIS |
| **Metals** | | | | |
| Barium | 1.43E-04 | HEAST | 7.00E-02 | IRIS |
| Cadmium | 5.71E-06 | Cal/EPA 2003 | 1.00E-03 | IRIS |
| Chromium (Total) | ---- | | 1.50E+00 | IRIS |
| Chromium (VI) | 5.71E-05 | Cal/EPA 2003 | 3.00E-03 | IRIS |
| Cobalt | 5.70E-06 | NCEA | 2.00E-02 | NCEA |
| Copper | ---- | | 4.00E-02 | HEAST |
| Lead | NA | | NA | |
| Mercury | 2.57E-05 | Cal/EPA 2003 | 3.00E-04 | IRIS |
| Nickel | 1.43E-05 | Cal/EPA 2003 | 2.00E-02 | IRIS (f) |
| Vanadium | ---- | | 7.00E-03 | HEAST |
| Zinc | ---- | | 3.00E-01 | IRIS |

Notes:

CalEPA = California Environmental Protection Agency.
HEAST = Health Effects Assessment Summary Tables
IRIS = Integrated Risk Information System
NCEA = National Center for Environmental Assessment
USEPA = United States Environmental Protection Agency

mg/kg-day = milogram/kilogram-day
$\mu g/m^3$ = microgram/cubic meter

[a] Route to route extrapolation
[b] Toxicity value for methyl isobutyl ketone was used as a surrogate value for 2-hexanone.
[c] Toxicity value for isopropylbenzene was used as a surrogate value for p-isopropyltoluene
[d] Toxicity value for 1,2,4-trichlorobenzene was used as a surrogate value 1,2,3-trichlorobenzene.
[e] Toxicity value for naphthalene was used as a surrogate value for acenaphthylene and benzo(g,h,i)perylene
[f] Listed value is for Nickel (soluble salts)

Sources:

California Environmental Protection Agency (Cal/EPA). 2003. *All Chronic Reference Exposure Levels Adopted by Office of Environmental Health Hazard Assessment.* August

National Center for Environmental Assessment (NCEA). 2002. Cited in USEPA Region 9 Preliminary Remediation Goals (PRGs) 2002. San Francisco, CA. October

United States Environmental Protection Agency (USEPA). 1997. *Health Effects Assessment Summary Tables (HEAST).* FY 1997 Update. EPA 540-R-97-036. Office of Solid Waste and Emergency Response. Washington, D.C. July

United States Environmental Protection Agency (USEPA). 1999. *Drinking Water Regulations and Health Advisories. Table.* Office of Science and Technology

United States Environmental Protection Agency (USEPA). 2004. Integrated Risk Information System (IRIS). Online database maintained by the USEPA. Cincinnati, OH.

## TABLE 2.15

**Estimated Cancer Risks and Noncancer Hazard Indices for Soil Gas - Future Indoor Commercial Worker[a]**
**1550 N. Bonnie Beach Place**
**Los Angeles, California**

| Chemical | Maximum Concentration (µg/m³) | Future Indoor Commercial Worker | |
|---|---|---|---|
| | | Cancer Risk | Hazard Index |
| **Volatile Organic Compounds (VOCs)** | | | |
| Ethylbenzene | 1.20E+03 | NC | 1.17E-06 |
| Freon 113 | 2.60E+04 | NC | 1.48E-06 |
| Tetrachloroethene | 1.40E+04 | 5.15E-08 | 6.86E-04 |
| Toluene | 5.00E+03 | NC | 3.79E-05 |
| 1,1,1-Trichloroethane | 1.20E+03 | NC | 2.23E-06 |
| Trichloroethene | 5.70E+04 | 8.08E-08 | 1.89E-04 |
| 1,2,4-Trimethylbenzene | 2.50E+03 | NC | 7.34E-04 |
| Total Xylenes | 6.40E+03 | NC | 1.85E-05 |
| | **Cumulative Risk** | 1.3E-07 | |
| | **Cumulative Hazard Index** | | 0.002 |

Notes:
NC = Not calculated because chemical is not evaluated as a carcinogen.

µg/m³ = microgram/cubic meter

[a] Risk estimates assume potential exposure through the migration of volatile chemicals from soil gas to indoor air.

## TABLE 2.16

## Estimated Cancer Risks and Noncancer Hazard Indices for Soil - Future Indoor Commercial Worker[a] - All Chemicals
## 1550 N. Bonnie Beach Place
## Los Angeles, California

| Chemical | Maximum Concentration (µg/kg) | Future Indoor Commercial Worker | |
|---|---|---|---|
| | | Cancer Risk | Hazard Index |
| **Volatile Organic Compounds (VOCs)** | | | |
| Acetone | 2.79E+05 | NC | 3.22E-02 |
| Benzene | 2.29E+02 | 5.48E-06 | 8.98E-03 |
| Bromobenzene | 1.86E+01 | NC | 5.14E-03 |
| sec-Butylbenzene | 1.38E+03 | NC | 1.64E-02 |
| tert-Butylbenzene | 9.60E+01 | NC | 2.76E-03 |
| Chlorobenzene | 2.85E+01 | NC | 8.07E-05 |
| Chloroform | 3.15E+01 | 1.45E-07 | 2.50E-04 |
| 1,2-Dichlorobenzene | 4.25E+02 | NC | 4.50E-03 |
| 1,4-Dichlorobenzene | 3.19E+01 | 2.99E-07 | 9.20E-05 |
| 1,1-Dichloroethane | 2.13E+02 | 3.31E-07 | 1.16E-03 |
| 1,2-Dichloroethane | 4.04E+02 | 6.05E-06 | 2.06E-03 |
| 1,1-Dichloroethene | 2.42E+02 | NC | 1.69E-02 |
| cis-1,2-Dichloroethene | 7.82E+03 | NC | 6.93E-01 |
| trans-1,2-Dichloroethene | 2.13E+01 | NC | 1.29E-03 |
| Ethylbenzene | 2.44E+04 | NC | 4.61E-02 |
| Freon 113 | 1.04E+03 | NC | 6.00E-05 |
| 2-Hexanone | 1.80E+02 | NC | 4.70E-02 |
| Isopropylbenzene (Cumene) | 4.35E+02 | NC | 1.83E-02 |
| p-Isopropyltoluene (Cymene) | 7.10E+02 | NC | 8.04E-03 |
| Methyl Ethyl Ketone | 4.66E+04 | NC | 4.41E-03 |
| Methyl Isobutyl Ketone | 9.70E+02 | NC | 1.02E-02 |
| Methyl tertiary butyl ether (MTBE) | 9.10E+00 | 1.53E-09 | 2.21E-06 |
| Naphthalene | 1.53E+02 | NC | 2.31E-02 |
| n-Propylbenzene | 1.00E+03 | NC | 2.76E-02 |
| Styrene | 4.06E+03 | NC | 1.11E-02 |
| 1,1,1,2-Tetrachloroethane | 5.67E+01 | 3.49E-07 | 1.25E-03 |
| 1,1,2,2-Tetrachloroethane | 5.52E+04 | 1.45E-03 | 3.37E-01 |
| Tetrachloroethene | 2.21E+05 | 2.57E-03 | 3.41E+01 |
| Toluene | 4.33E+03 | NC | 5.49E-02 |
| 1,2,3-Trichlorobenzene | 8.20E+00 | NC | 1.12E-04 |
| 1,1,1-Trichloroethane | 2.34E+03 | NC | 6.97E-03 |
| 1,1,2-Trichloroethane | 8.10E+02 | 5.54E-06 | 6.80E-02 |
| Trichloroethene | 1.52E+04 | 2.15E-05 | 5.09E-02 |
| 1,2,4-Trimethylbenzene | 3.58E+03 | NC | 1.86E+00 |
| 1,3,5-Trimethylbenzene | 1.50E+03 | NC | 7.72E-01 |
| Total Xylenes | 6.41E+03 | NC | 3.47E-02 |
| Vinyl chloride | 9.29E+02 | 1.81E-04 | 6.47E-02 |
| | **Total VOCs** | 4.24E-03 | 3.83E+01 |
| **Semi-Volatile Organic Compounds (SVOCs)** | | | |
| bis(2-Ethylhexyl)phthalate | 9.22E+02 | 1.59E-09 | 7.40E-05 |
| Butyl benzyl phthalate | 3.42E+03 | NC | 2.74E-05 |
| | **Total SVOCs** | 1.59E-09 | 1.01E-04 |
| **Polycyclic Aromatic Hydrocarbons (PAHs)** | | | |
| Acenaphthylene | 1.46E+02 | NC | 1.42E-05 |
| Benzo(g,h,i)perylene | 2.30E+01 | NC | 2.23E-06 |
| Pyrene | 2.43E+03 | NC | 1.57E-04 |

## TABLE 2.16

## Estimated Cancer Risks and Noncancer Hazard Indices for Soil - Future Indoor Commercial Worker[a] - All Chemicals

## 1550 N. Bonnie Beach Place

## Los Angeles, California

| Chemical | Maximum Concentration (µg/kg) | Future Indoor Commercial Worker Cancer Risk | Future Indoor Commercial Worker Hazard Index |
|---|---|---|---|
| | **Total PAHs** | NC | 1.74E-04 |
| **Pesticides** | | | |
| alpha-BHC | 1.40E+01 | 1.26E-08 | 2.62E-05 |
| Endrin | 7.00E+00 | NC | 3.74E-05 |
| gamma-Hexachlorocyclohexane | 1.30E+01 | 4.78E-09 | 4.05E-05 |
| Heptachlor epoxide | 7.00E+00 | 2.21E-08 | 8.64E-04 |
| 4,4'-DDD | 3.82E+02 | 2.70E-08 | NA |
| 4,4'-DDE | 1.40E+01 | 1.40E-09 | NA |
| 4,4'-DDT | 1.76E+02 | 1.76E-08 | 2.90E-04 |
| | **Total Pesticides** | 8.55E-08 | 1.26E-03 |
| **Metals** | | | |
| Barium | 1.59E+05 | NC | 1.33E-03 |
| Chromium (Total) | 2.33E+04 | 6.85E-08 | 7.60E-06 |
| Chromium (VI) | 2.80E+02 | 1.00E-08 | 4.66E-05 |
| Cobalt | 9.65E+03 | 6.62E-09 | 5.68E-04 |
| Copper | 3.68E+04 | NC | 4.50E-04 |
| Mercury | 9.50E+02 | NC | 1.56E-03 |
| Nickel | 2.03E+04 | 1.29E-09 | 7.75E-04 |
| Vanadium | 4.49E+04 | NC | 3.14E-03 |
| Zinc | 9.55E+04 | NC | 1.56E-04 |
| | **Total Metals** | 8.64E-08 | 8.03E-03 |
| | **Cumulative Risk** | 4 24E-03 | |
| | **Cumulative Hazard Index** | | 38 |

Notes:

NA = Not available Toxicity factor not available for this chemical.

NC = Not calculated because chemical is not evaluated as a carcinogen

µg/kg = microgram/kilogram

[a] Risk estimates assume potential exposure through the migration of volatile chemicals from soil gas to indoor air, inhalation of airborne particulates, incidental ingestion of soil, and dermal contact with soil.

## TABLE 2.17

## Estimated Cancer Risks and Noncancer Hazard Indices for Soil - Future Indoor Commercial Worker[a] - Volatile Organic Compounds by Pathway

## 1550 N. Bonnie Beach Place

## Los Angeles, California

| Chemical | Maximum Concentration (µg/kg) | Future Indoor Commercial Worker | | | | | |
|---|---|---|---|---|---|---|---|
| | | Cancer Risk | | | Noncancer Hazard | | |
| | | Inhalation | Ingestion | Total Risk | Inhalation | Ingestion | Hazard Index |
| **Volatile Organic Compounds (VOCs)** | | | | | | | |
| Acetone | 2.79E+05 | NC | NC | NC | 3.21E-02 | 1.52E-04 | 3.22E-02 |
| Benzene | 2.29E+02 | 5.47E-06 | 4.00E-09 | 5.48E-06 | 8.94E-03 | 3.73E-05 | 8.98E-03 |
| Bromobenzene | 1.86E+01 | NC | NC | NC | 5.14E-03 | 4.55E-07 | 5.14E-03 |
| sec-Butylbenzene | 1.38E+03 | NC | NC | NC | 1.64E-02 | 1.69E-05 | 1.64E-02 |
| tert-Butylbenzene | 9.60E+01 | NC | NC | NC | 2.76E-03 | 1.17E-06 | 2.76E-03 |
| Chlorobenzene | 2.85E+01 | NC | NC | NC | 8.00E-05 | 6.97E-07 | 8.07E-05 |
| Chloroform | 3.15E+01 | 1.45E-07 | 1.71E-10 | 1.45E-07 | 2.49E-04 | 1.54E-06 | 2.50E-04 |
| 1,2-Dichlorobenzene | 4.25E+02 | NC | NC | NC | 4.50E-03 | 2.31E-06 | 4.50E-03 |
| 1,4-Dichlorobenzene | 3.19E+01 | 2.99E-07 | 3.01E-11 | 2.99E-07 | 9.15E-05 | 5.20E-07 | 9.20E-05 |
| 1,1-Dichloroethane | 2.13E+02 | 3.30E-07 | 2.12E-10 | 3.31E-07 | 1.16E-03 | 1.04E-06 | 1.16E-03 |
| 1,2-Dichloroethane | 4.04E+02 | 6.05E-06 | 3.32E-09 | 6.05E-06 | 2.06E-03 | 6.59E-06 | 2.06E-03 |
| 1,1-Dichloroethene | 2.42E+02 | NC | NC | NC | 1.69E-02 | 2.37E-06 | 1.69E-02 |
| cis-1,2-Dichloroethene | 7.82E+03 | NC | NC | NC | 6.93E-01 | 3.83E-04 | 6.93E-01 |
| trans-1,2-Dichloroethene | 2.13E+01 | NC | NC | NC | 1.29E-03 | 5.21E-07 | 1.29E-03 |
| Ethylbenzene | 2.44E+04 | NC | NC | NC | 4.60E-02 | 1.19E-04 | 4.61E-02 |
| Freon 113 | 1.04E+03 | NC | NC | NC | 6.00E-05 | 1.70E-08 | 6.00E-05 |
| 2-Hexanone | 1.80E+02 | NC | NC | NC | 4.70E-02 | 1.10E-06 | 4.70E-02 |
| Isopropylbenzene (Cumene) | 4.35E+02 | NC | NC | NC | 1.83E-02 | 2.13E-06 | 1.83E-02 |
| p-Isopropyltoluene (Cymene) | 7.10E+02 | NC | NC | NC | 8.03E-03 | 3.47E-06 | 8.04E-03 |
| Methyl Ethyl Ketone | 4.66E+04 | NC | NC | NC | 4.38E-03 | 3.80E-05 | 4.41E-03 |
| Methyl Isobutyl Ketone | 9.70E+02 | NC | NC | NC | 1.02E-02 | 5.93E-06 | 1.02E-02 |
| Methyl tertiary butyl ether (MTBE) | 9.10E+00 | 1.53E-09 | 2.86E-12 | 1.53E-09 | 2.06E-06 | 1.48E-07 | 2.21E-06 |
| Naphthalene | 1.53E+02 | NC | NC | NC | 2.31E-02 | 3.74E-06 | 2.31E-02 |
| n-Propylbenzene | 1.00E+03 | NC | NC | NC | 2.75E-02 | 1.22E-05 | 2.76E-02 |
| Styrene | 4.06E+03 | NC | NC | NC | 1.11E-02 | 9.93E-06 | 1.11E-02 |
| 1,1,1,2-Tetrachloroethane | 5.67E+01 | 3.48E-07 | 2.58E-10 | 3.49E-07 | 1.25E-03 | 9.25E-07 | 1.25E-03 |
| 1,1,2,2-Tetrachloroethane | 5.52E+04 | 1.44E-03 | 2.60E-06 | 1.45E-03 | 3.37E-01 | 4.50E-04 | 3.37E-01 |
| Tetrachloroethene | 2.21E+05 | 2.55E-03 | 2.09E-05 | 2.57E-03 | 3.40E+01 | 6.36E-04 | 3.41E+01 |
| Toluene | 4.33E+03 | NC | NC | NC | 5.49E-02 | 1.06E-05 | 5.49E-02 |
| 1,2,3-Trichlorobenzene | 8.20E+00 | NC | NC | NC | 1.12E-04 | 4.01E-07 | 1.12E-04 |

## TABLE 2.17

**Estimated Cancer Risks and Noncancer Hazard Indices for Soil - Future Indoor Commercial Worker[a] - Volatile Organic Compounds by Pathway**
**1550 N. Bonnie Beach Place**
**Los Angeles, California**

| Chemical | Maximum Concentration (µg/kg) | Future Indoor Commercial Worker | | | | | |
|---|---|---|---|---|---|---|---|
| | | Cancer Risk | | | Noncancer Hazard | | |
| | | Inhalation | Ingestion | Total Risk | Inhalation | Ingestion | Hazard Index |
| 1,1,1-Trichloroethane | 2.34E+03 | NC | NC | NC | 6.97E-03 | 4.09E-06 | 6.97E-03 |
| 1,1,2-Trichloroethane | 8.10E+02 | 5.53E-06 | 1.02E-08 | 5.54E-06 | 6.79E-02 | 9.91E-05 | 6.80E-02 |
| Trichloroethene | 1.52E+04 | 2.15E-05 | 3.45E-08 | 2.15E-05 | 5.01E-02 | 7.44E-04 | 5.09E-02 |
| 1,2,4-Trimethylbenzene | 3.58E+03 | NC | NC | NC | 1.86E+00 | 3.50E-05 | 1.86E+00 |
| 1,3,5-Trimethylbenzene | 1.50E+03 | NC | NC | NC | 7.72E-01 | 1.47E-05 | 7.72E-01 |
| Total Xylenes | 6.41E+03 | NC | NC | NC | 3.47E-02 | 1.57E-05 | 3.47E-02 |
| Vinyl chloride | 9.29E+02 | 1.81E-04 | 4.38E-08 | 1.81E-04 | 6.46E-02 | 1.52E-04 | 6.47E-02 |
| | **Total VOCs** | 4.22E-03 | 2.36E-05 | 4.24E-03 | 3.83E+01 | 2.96E-03 | 3.83E+01 |

Notes:
NA = Not available. Toxicity factor not available for this chemical.
NC = Not calculated because chemical is not evaluated as a carcinogen.

µg/kg = microgram/kilogram

[a] Risk estimates assume potential exposure through the migration of volatile chemicals from soil gas to indoor air, inhalation of airborne particulates, incidental ingestion of soil, and dermal contact with soil.

## TABLE 2.18

**Estimated Cancer Risks and Noncancer Hazard Indices for Soil Gas - Future Outdoor Commercial Worker[a]**
**1550 N. Bonnie Beach Place**
**Los Angeles, California**

| Chemical | Maximum Concentration ($\mu g/m^3$) | Future Indoor Commercial Worker | |
|---|---|---|---|
| | | Cancer Risk | Hazard Index |
| **Volatile Organic Compounds (VOCs)** | | | |
| Ethylbenzene | 1.20E+03 | NC | 1.24E-08 |
| Freon 113 | 2.60E+04 | NC | 1.56E-08 |
| Tetrachloroethene | 1.40E+04 | 5.43E-10 | 7.24E-06 |
| Toluene | 5.00E+03 | NC | 4.04E-07 |
| 1,1,1-Trichloroethane | 1.20E+03 | NC | 2.36E-08 |
| Trichloroethene | 5.70E+04 | 8.57E-10 | 2.00E-06 |
| 1,2,4-Trimethylbenzene | 2.50E+03 | NC | 7.74E-06 |
| Total Xylenes | 6.40E+03 | NC | 1.96E-07 |
| | **Cumulative Risk** | 1.4E-09 | |
| | **Cumulative Hazard Index** | | 2.E-05 |

Notes:
NC = Not calculated because chemical is not evaluated as a carcinogen.

$\mu g/m^3$ = microgram/cubic meter

[a] Risk estimates assume potential exposure through the migration of volatile chemicals from soil gas to indoor air.

## TABLE 2.19

## Estimated Cancer Risks and Noncancer Hazard Indices for Soil - Future Outdoor Commercial Worker[a] - All Chemicals

## 1550 N. Bonnie Beach Place

## Los Angeles, California

| Chemical | Maximum Concentration (µg/kg) | Future Outdoor Commercial Worker | |
|---|---|---|---|
| | | Cancer Risk | Hazard Index |
| **Volatile Organic Compounds (VOCs)** | | | |
| Acetone | 2.79E+05 | NC | 1.95E-03 |
| Benzene | 2.29E+02 | 6.33E-08 | 1.34E-04 |
| Bromobenzene | 1.86E+01 | NC | 5.56E-05 |
| sec-Butylbenzene | 1.38E+03 | NC | 2.08E-04 |
| tert-Butylbenzene | 9.60E+01 | NC | 3.00E-05 |
| Chlorobenzene | 2.85E+01 | NC | 1.55E-06 |
| Chloroform | 3.15E+01 | 1.76E-09 | 4.27E-06 |
| 1,2-Dichlorobenzene | 4.25E+02 | NC | 5.19E-05 |
| 1,4-Dichlorobenzene | 3.19E+01 | 3.28E-09 | 1.52E-06 |
| 1,1-Dichloroethane | 2.13E+02 | 3.75E-09 | 1.35E-05 |
| 1,2-Dichloroethane | 4.04E+02 | 7.41E-08 | 3.07E-05 |
| 1,1-Dichloroethene | 2.42E+02 | NC | 1.79E-04 |
| cis-1,2-Dichloroethene | 7.82E+03 | NC | 7.79E-03 |
| trans-1,2-Dichloroethene | 2.13E+01 | NC | 1.41E-05 |
| Ethylbenzene | 2.44E+04 | NC | 6.04E-04 |
| Freon 113 | 1.04E+03 | NC | 6.65E-07 |
| 2-Hexanone | 1.80E+02 | NC | 5.83E-04 |
| Isopropylbenzene (Cumene) | 4.35E+02 | NC | 1.90E-04 |
| p-Isopropyltoluene (Cymene) | 7.10E+02 | NC | 8.71E-05 |
| Methyl Ethyl Ketone | 4.66E+04 | NC | 2.09E-04 |
| Methyl Isobutyl Ketone | 9.70E+02 | NC | 2.07E-04 |
| Methyl tertiary butyl ether (MTBE) | 9.10E+00 | 2.18E-11 | 1.74E-07 |
| Naphthalene | 1.53E+02 | NC | 3.00E-04 |
| n-Propylbenzene | 1.00E+03 | NC | 3.00E-04 |
| Styrene | 4.06E+03 | NC | 1.30E-04 |
| 1,1,1,2-Tetrachloroethane | 5.67E+01 | 4.05E-09 | 1.45E-05 |
| 1,1,2,2-Tetrachloroethane | 5.52E+04 | 2.25E-05 | 5.10E-03 |
| Tetrachloroethene | 2.21E+05 | 4.74E-05 | 3.55E-01 |
| Toluene | 4.33E+03 | NC | 5.91E-04 |
| 1,2,3-Trichlorobenzene | 8.20E+00 | NC | 1.57E-06 |
| 1,1,1-Trichloroethane | 2.34E+03 | NC | 7.79E-05 |
| 1,1,2-Trichloroethane | 8.10E+02 | 7.88E-08 | 9.42E-04 |
| Trichloroethene | 1.52E+04 | 2.67E-07 | 1.29E-03 |
| 1,2,4-Trimethylbenzene | 3.58E+03 | NC | 1.96E-02 |
| 1,3,5-Trimethylbenzene | 1.50E+03 | NC | 8.17E-03 |
| Total Xylenes | 6.41E+03 | NC | 3.81E-04 |
| Vinyl chloride | 9.29E+02 | 1.93E-06 | 8.25E-04 |
| | **Total VOCs** | 7.24E-05 | 4.05E-01 |
| **Semi-Volatile Organic Compounds (SVOCs)** | | | |
| bis(2-Ethylhexyl)phthalate | 9.22E+02 | 1.59E-09 | 7.40E-05 |
| Butyl benzyl phthalate | 3.42E+03 | NC | 2.74E-05 |

## TABLE 2.19

**Estimated Cancer Risks and Noncancer Hazard Indices for Soil - Future Outdoor Commercial Worker[a] - All Chemicals**
**1550 N. Bonnie Beach Place**
**Los Angeles, California**

| Chemical | Maximum Concentration (µg/kg) | Future Outdoor Commercial Worker | |
|---|---|---|---|
| | | Cancer Risk | Hazard Index |
| | **Total SVOCs** | 1.59E-09 | 1.01E-04 |
| **Polycyclic Aromatic Hydrocarbons (PAHs)** | | | |
| Acenaphthylene | 1.46E+02 | NC | 1.42E-05 |
| Benzo(g,h,i)perylene | 2.30E+01 | NC | 2.23E-06 |
| Pyrene | 2.43E+03 | NC | 1.57E-04 |
| | **Total PAHs** | NC | 1.74E-04 |
| **Pesticides** | | | |
| alpha-BHC | 1.40E+01 | 1.26E-08 | 2.62E-05 |
| Endrin | 7.00E+00 | NC | 3.74E-05 |
| gamma-Hexachlorocyclohexane | 1.30E+01 | 4.78E-09 | 4.05E-05 |
| Heptachlor epoxide | 7.00E+00 | 2.21E-08 | 8.64E-04 |
| 4,4'-DDD | 3.82E+02 | 2.70E-08 | NA |
| 4,4'-DDE | 1.40E+01 | 1.40E-09 | NA |
| 4,4'-DDT | 1.76E+02 | 1.76E-08 | 2.90E-04 |
| | **Total Pesticides** | 8.55E-08 | 1.26E-03 |
| **Metals** | | | |
| Barium | 1.59E+05 | NC | 1.33E-03 |
| Chromium (Total) | 2.33E+04 | 6.85E-08 | 7.60E-06 |
| Chromium (VI) | 2.80E+02 | 1.00E-08 | 4.66E-05 |
| Chromium (total) | NA | NA | NA |
| Cobalt | 9.65E+03 | 6.62E-09 | 5.68E-04 |
| Copper | 3.68E+04 | NC | 4.50E-04 |
| Mercury | 9.50E+02 | NC | 1.56E-03 |
| Nickel | 2.03E+04 | 1.29E-09 | 7.75E-04 |
| Vanadium | 4.49E+04 | NC | 3.14E-03 |
| Zinc | 9.55E+04 | NC | 1.56E-04 |
| | **Total Metals** | 8.64E-08 | 8.03E-03 |
| | **Cumulative Risk** | 7 25E-05 | |
| | **Cumulative Hazard Index** | | 0.41 |

Notes:
NA = Not available Toxicity factor not available for this chemical
NC = Not calculated because chemical is not evaluated as a carcinogen

µg/kg = microgram/kilogram

[a] Risk estimates assume potential exposure through the migration of volatile chemicals from soil gas to ambient air, inhalation of airborne particulates, incidental ingestion of soil, and dermal contact with soil.

## TABLE 2.20

**Estimated Cancer Risks and Noncancer Hazard Indices for Soil - Future Outdoor Commercial Worker[a] - Volatile Organic Compounds by Pathway**
**1550 N. Bonnie Beach Place**
**Los Angeles, California**

| | Maximum | Future Outdoor Commercial Worker | | | | | |
|---|---|---|---|---|---|---|---|
| | Concentration | Cancer Risk | | | Noncancer Hazard | | |
| Chemical | (µg/kg) | Inhalation | Ingestion | Total Risk | Inhalation | Ingestion | Hazard Index |
| **Volatile Organic Compounds (VOCs)** | | | | | | | |
| Acetone | 2.79E+05 | NC | NC | NC | 1.79E-03 | 1.52E-04 | 1.95E-03 |
| Benzene | 2.29E+02 | 5.93E-08 | 4.00E-09 | 6.33E-08 | 9.69E-05 | 3.73E-05 | 1.34E-04 |
| Bromobenzene | 1.86E+01 | NC | NC | NC | 5.51E-05 | 4.55E-07 | 5.56E-05 |
| sec-Butylbenzene | 1.38E+03 | NC | NC | NC | 1.91E-04 | 1.69E-05 | 2.08E-04 |
| tert-Butylbenzene | 9.60E+01 | NC | NC | NC | 2.88E-05 | 1.17E-06 | 3.00E-05 |
| Chlorobenzene | 2.85E+01 | NC | NC | NC | 8.57E-07 | 6.97E-07 | 1.55E-06 |
| Chloroform | 3.15E+01 | 1.59E-09 | 1.71E-10 | 1.76E-09 | 2.73E-06 | 1.54E-06 | 4.27E-06 |
| 1,2-Dichlorobenzene | 4.25E+02 | NC | NC | NC | 4.96E-05 | 2.31E-06 | 5.19E-05 |
| 1,4-Dichlorobenzene | 3.19E+01 | 3.25E-09 | 3.01E-11 | 3.28E-09 | 9.96E-07 | 5.20E-07 | 1.52E-06 |
| 1,1-Dichloroethane | 2.13E+02 | 3.54E-09 | 2.12E-10 | 3.75E-09 | 1.24E-05 | 1.04E-06 | 1.35E-05 |
| 1,2-Dichloroethane | 4.04E+02 | 7.08E-08 | 3.32E-09 | 7.41E-08 | 2.41E-05 | 6.59E-06 | 3.07E-05 |
| 1,1-Dichloroethene | 2.42E+02 | NC | NC | NC | 1.77E-04 | 2.37E-06 | 1.79E-04 |
| cis-1,2-Dichloroethene | 7.82E+03 | NC | NC | NC | 7.41E-03 | 3.83E-04 | 7.79E-03 |
| trans-1,2-Dichloroethene | 2.13E+01 | NC | NC | NC | 1.36E-05 | 5.21E-07 | 1.41E-05 |
| Ethylbenzene | 2.44E+04 | NC | NC | NC | 4.85E-04 | 1.19E-04 | 6.04E-04 |
| Freon 113 | 1.04E+03 | NC | NC | NC | 6.48E-07 | 1.70E-08 | 6.65E-07 |
| 2-Hexanone | 1.80E+02 | NC | NC | NC | 5.82E-04 | 1.10E-06 | 5.83E-04 |
| Isopropylbenzene (Cumene) | 4.35E+02 | NC | NC | NC | 1.88E-04 | 2.13E-06 | 1.90E-04 |
| p-Isopropyltoluene (Cymene) | 7.10E+02 | NC | NC | NC | 8.36E-05 | 3.47E-06 | 8.71E-05 |
| Methyl Ethyl Ketone | 4.66E+04 | NC | NC | NC | 1.71E-04 | 3.80E-05 | 2.09E-04 |
| Methyl Isobutyl Ketone | 9.70E+02 | NC | NC | NC | 2.01E-04 | 5.93E-06 | 2.07E-04 |
| Methyl tertiary butyl ether (MTBE) | 9.10E+00 | 1.89E-11 | 2.86E-12 | 2.18E-11 | 2.55E-08 | 1.48E-07 | 1.74E-07 |
| Naphthalene | 1.53E+02 | NC | NC | NC | 2.96E-04 | 3.74E-06 | 3.00E-04 |
| n-Propylbenzene | 1.00E+03 | NC | NC | NC | 2.88E-04 | 1.22E-05 | 3.00E-04 |
| Styrene | 4.06E+03 | NC | NC | NC | 1.20E-04 | 9.93E-06 | 1.30E-04 |
| 1,1,1,2-Tetrachloroethane | 5.67E+01 | 3.79E-09 | 2.58E-10 | 4.05E-09 | 1.36E-05 | 9.25E-07 | 1.45E-05 |
| 1,1,2,2-Tetrachloroethane | 5.52E+04 | 1.99E-05 | 2.60E-06 | 2.25E-05 | 4.65E-03 | 4.50E-04 | 5.10E-03 |
| Tetrachloroethene | 2.21E+05 | 2.66E-05 | 2.09E-05 | 4.74E-05 | 3.54E-01 | 6.36E-04 | 3.55E-01 |
| Toluene | 4.33E+03 | NC | NC | NC | 5.81E-04 | 1.06E-05 | 5.91E-04 |
| 1,2,3-Trichlorobenzene | 8.20E+00 | NC | NC | NC | 1.17E-06 | 4.01E-07 | 1.57E-06 |
| 1,1,1-Trichloroethane | 2.34E+03 | NC | NC | NC | 7.38E-05 | 4.09E-06 | 7.79E-05 |
| 1,1,2-Trichloroethane | 8.10E+02 | 6.86E-08 | 1.02E-08 | 7.88E-08 | 8.43E-04 | 9.91E-05 | 9.42E-04 |
| Trichloroethene | 1.52E+04 | 2.32E-07 | 3.45E-08 | 2.67E-07 | 5.42E-04 | 7.44E-04 | 1.29E-03 |
| 1,2,4-Trimethylbenzene | 3.58E+03 | NC | NC | NC | 1.96E-02 | 3.50E-05 | 1.96E-02 |
| 1,3,5-Trimethylbenzene | 1.50E+03 | NC | NC | NC | 8.16E-03 | 1.47E-05 | 8.17E-03 |
| Total Xylenes | 6.41E+03 | NC | NC | NC | 3.65E-04 | 1.57E-05 | 3.81E-04 |
| Vinyl chloride | 9.29E+02 | 1.88E-06 | 4.38E-08 | 1.93E-06 | 6.74E-04 | 1.52E-04 | 8.25E-04 |
| | **Total VOCs** | 4.88E-05 | 2.36E-05 | 7.24E-05 | 4.02E-01 | 2.96E-03 | 4.05E-01 |

Notes:
NA = Not available Toxicity factor not available for this chemical
NC = Not calculated because chemical is not evaluated as a carcinogen

µg/kg = microgram/kilogram

[a] Risk estimates assume potential exposure through the migration of volatile chemicals from soil gas to ambient air inhalation of airborne particulates incidental ingestion of soil and dermal contact with soil.

# TABLE 2.21

## Risk-Based Target Concentrations (RBTCs) for Soil Gas and Soil - Future Indoor Commercial Workers[a,b]

## 1550 N. Bonnie Beach Place

## Los Angeles, California

| Chemical | Soil Gas RBTCs (µg/m$^3$) | | Soil RBTCs (µg/kg) | |
|---|---|---|---|---|
| | Cancer | Noncancer | Cancer | Noncancer |
| **Volatile Organic Compounds (VOCs)** | | | | |
| Acetone | NC | 9.35E+07 | NC | 8.65E+06 |
| Benzene | 4.06E+04 | 2.48E+07 | 4.18E+01 | 2.55E+04 |
| Bromobenzene | NC | 4.41E+06 | NC | 3.62E+03 |
| sec-Butylbenzene | NC | 3.48E+07 | NC | 8.43E+04 |
| tert-Butylbenzene | NC | 9.64E+07 | NC | 3.48E+04 |
| Chlorobenzene | NC | 4.35E+08 | NC | 3.53E+05 |
| Chloroform | 1.72E+05 | 1.00E+08 | 2.18E+02 | 1.26E+05 |
| 1,2-Dichlorobenzene | NC | 7.13E+07 | NC | 9.44E+04 |
| 1,4-Dichlorobenzene | 9.69E+04 | 3.16E+08 | 1.07E+02 | 3.47E+05 |
| 1,1-Dichloroethane | 8.01E+05 | 2.28E+08 | 6.44E+02 | 1.84E+05 |
| 1,2-Dichloroethane | 2.75E+04 | 8.08E+07 | 6.68E+01 | 1.96E+05 |
| 1,1-Dichloroethene | NC | 3.38E+07 | NC | 1.43E+04 |
| cis-1,2-Dichloroethene | NC | 1.47E+07 | NC | 1.13E+04 |
| trans-1,2-Dichloroethene | NC | 3.67E+07 | NC | 1.65E+04 |
| Ethylbenzene | NC | 1.03E+09 | NC | 5.29E+05 |
| Freon 113 | NC | 1.75E+10 | NC | 1.73E+07 |
| 2-Hexanone | NC | 7.28E+04 | NC | 3.83E+03 |
| Isopropylbenzene (Cumene) | NC | 2.68E+08 | NC | 2.38E+04 |
| p-Isopropyltoluene (Cymene) | NC | 2.73E+08 | NC | 8.83E+04 |
| Methyl Ethyl Ketone | NC | 1.83E+08 | NC | 1.06E+07 |
| Methyl Isobutyl Ketone | NC | 5.59E+06 | NC | 9.49E+04 |
| Methyl tertiary butyl ether (MTBE) | 1.68E+06 | 1.25E+09 | 5.94E+03 | 4.12E+06 |
| Naphthalene | NC | 1.50E+06 | NC | 6.62E+03 |
| n-Propylbenzene | NC | 8.98E+07 | NC | 3.63E+04 |
| Styrene | NC | 3.70E+08 | NC | 3.67E+05 |
| 1,1,1,2-Tetrachloroethane | 1.47E+05 | 4.09E+07 | 1.63E+02 | 4.53E+04 |
| 1,1,2,2-Tetrachloroethane | 6.33E+03 | 2.71E+07 | 3.82E+01 | 1.64E+05 |
| Tetrachloroethene | 2.72E+05 | 2.04E+07 | 8.58E+01 | 6.49E+03 |
| Toluene | NC | 1.32E+08 | NC | 7.89E+04 |
| 1,2,3-Trichlorobenzene | NC | 2.03E+08 | NC | 7.29E+04 |
| 1,1,1-Trichloroethane | NC | 5.39E+08 | NC | 3.36E+05 |
| 1,1,2-Trichloroethane | 3.89E+04 | 3.17E+06 | 1.46E+02 | 1.19E+04 |
| Trichloroethene | 7.05E+05 | 3.02E+08 | 7.06E+02 | 2.99E+05 |
| 1,2,4-Trimethylbenzene | NC | 3.41E+06 | NC | 1.93E+03 |
| 1,3,5-Trimethylbenzene | NC | 3.31E+06 | NC | 1.94E+03 |
| Total Xylenes | NC | 3.47E+08 | NC | 1.85E+05 |
| Vinyl chloride | 1.50E+04 | 4.20E+07 | 5.14E+00 | 1.43E+04 |

Notes:

NC = Not calculated because chemical is not evaluated as a carcinogen

µg/m$^3$ = microgram/cubic meter

[a] Based on depth of five feet below ground surface

[b] Risk-based target concentrations assume potential exposure through the migration of volatile chemicals from soil gas to indoor air

**Table 3.1: Summary of Potential ARARs**
**Davis Chemical**
**1550 N. Bonnie Beach Place**
**Los Angeles, California**

| Type/Name of Potential ARAR | Description of Requirement and Comments | Status |
|---|---|---|
| **POTENTIAL CHEMICAL-SPECIFIC ARARs** | | |
| Clean Air Act (CAA): National Primary and Secondary Ambient Air Quality Standards (NAAQS) (40 CFR 50-80) | The CAA regulates air emissions of substances that may harm public health. Air pollutants that may be of concern at the site during remedial activities is listed below, along with primary NAAQS standards:<br>• $PM_{10}$ (particulate matter, diameter 10 micrometer (µm) or less); annual – 50 micrograms per cubic meter (µg/m$^3$) 24-hour – 150 µg/m$^3$<br>Cleanup of the site is not likely to result in classification as a "major source" under the CAA unless emissions equal or exceed 100 tongs per year (tpy) of the pollutants for which the area is designated non-attainment. State implementation plans contain the specific regulations, which govern the emission rates for such areas. | Potentially Applicable |
| Clean Air Act (CAA): National Emission Standards for Hazardous Air Pollutants (NESHAP) (42 USC 7401 *et seq.*) | NESHAP is established on an industry- and process-specific basis and must provide "an ample margin of safety to protect public health." All major stationary and area sources that emit or have the potential to emit 10 tpy of any single hazardous air pollutant (HAP), or a total of 25 tpy of a combination of HAPs must comply with emission standards for that industry and HAP. This site contains chemicals of concern, which are listed as HAPs, however, it is very unlikely that the releases from the site will reach the 10 or 25 tpy threshold. | Potentially Applicable |
| Hazardous Waste Control Act (HWCA), as administered by the Department of Toxic Substances Control (DTSC) (22 CCR 66260 *et seq.*) | The HWCA mandates the control of hazardous wastes from point of generation through accumulation, transportation, treatment, storage, and ultimate disposal.<br><br>Criteria for Identifying Characteristics of Hazardous Wastes (22 CCR 66261.10 *et seq.*): Tests must be performed on chemicals to identify hazardous characteristics. If a chemical is either listed or tested and found hazardous, then remedial alternatives must comply with the hazardous waste management requirements.<br><br>Categories of Hazardous Wastes (22 CCR 66261.100 *et seq.*): In addition to listing the four RCRA hazardous waste characteristics (reactivity, corrosivity, ignitability, and the Toxicity Characteristics Leachate Procedure (TCLP), the HWCA regulations have established two other criteria: Total Threshold Limit Concentration (TTLC) and Soluble Threshold Limit Concentration (STLC) for classifying hazardous waste. Bioassays assessing mammalian and aquatic toxicity of wastes are also used to determine whether a waste is hazardous under the HWCA. If a chemical is either listed or tested and found hazardous, then remedial alternatives must comply with the hazardous waste management requirements. | <br><br>Potentially Applicable<br><br>Potentially Applicable |
| Porter-Cologne Water Quality | 23 CCR 2200 *et seq.*: This Act mandates regulations pertaining to land disposal unit design and construction | Potentially |

| Type/Name of Potential ARAR | Description of Requirement and Comments | Status |
|---|---|---|
| Act, as administered by the State Water Resources Board (SWRCB) and the. Regional Water Quality Control Board (Water Board) – Santa Ana Region. | standards that minimize dangers to the waters of the State. Wastes are classified as hazardous, designated, and non-hazardous, or inert, and are disposed of accordingly. Regulations regarding water quality Control protection standards are determined by the Water Board on a case-by-case basis | Applicable |
| **POTENTIAL LOCATION-SPECIFIC ARARs** | | |
| Resource Conservation and Recovery Act (RCRA) (42 USC 6901 *et seq.* 40 CFR 240-271) | RCRA establishes standards for the generation, management, and disposal of solid and hazardous waste. Certain remedial actions taken at the Davis site may include the generation and disposal of solid or hazardous waste subject to RCRA requirements. | Potentially Applicable |
| Clean Water Act (CWA) (33 USC 1251 *et seq.*; 40 CFR 100-140, 400-470) | The CWA regulates the discharge of nontoxic and toxic pollutants into surface water by specific and non-specific sources. The CWA also specifies water quality criteria, requirements for the state water quality standards based on these criteria, and wetlands regulations. | Potentially Applicable |
| **POTENTIAL ACTION-SPECIFIC ARARs** | | |
| HWCA (22 CCR 66260 *et seq.*) | The HWCA mandates the control of hazardous wastes from point of generation through accumulation, transportation, treatment, storage, and ultimate disposal. | Potentially Applicable |
| | Standards for Generations of Hazardous Waste (22 CCR 66262.10 *et seq.*): This regulation is applicable to hazardous waste resulting from remedial actions that generate hazardous waste on-site. | Potentially Applicable |
| | Standards for Transporters of Hazardous Waste (22 CCR 66263.10 *et seq.*): This regulation stipulates that hazardous waste must be transported by a hauler registered by the state. To the extent that hazardous wastes are transported for the remedial actions, the requirements are potentially applicable. | Potentially Applicable |
| | Hazardous Materials Release Response Plan and Inventory (H&S Code 25500 *et seq.*; 19 CCR 2700 *et seq.*): Businesses that handle hazardous materials are required to establish a plan for emergency response to a release or threatened release of hazardous materials. This requirement is applicable to the site and the hazardous materials release response plan and inventory should be incorporated into the site Health and Safety Plan. | Potentially Applicable |
| Mulford-Carrell Air Resources Act as Implemented by the South Coast Air Quality Management Districts (SCAQMD) and administered by the California Air Resources Board (CARB) (H&S Code 39000 *et seq.*) | The CARB and local air pollution control districts develop control measures aimed at reducing emissions of identified pollutants. Although it sets no standards, this Act is potentially applicable. | Potentially Applicable |

| Type/Name of Potential ARAR | Description of Requirement and Comments | Status |
|---|---|---|
| | | |
| SCAQMD Rules and Regulations | | |
| 1) Permits | | |
| a) Permits to Construct (Rule 201) | Remedial actions viewed as a "stationary source" by the SCAQMD will require a permit to construct prior to initiating the remedial action. | Potentially Applicable |
| b) Permits to Operate (Rule 203) | Permit to Operate Rule 203 Remedial actions deemed a "stationary source" will require a permit to operate. | Potentially Applicable |
| 2) Prohibitory Rules | | |
| a) Visible Emissions (Rule 401) | This rule limits visible emission from any point source. | Potentially Applicable |
| b) Nuisance (Rule 402) | This rule prohibits the discharge of any material, including odorous compounds that may cause injury, annoyance to the public, property, or business, or may endanger human health, comfort, peace, or safety. | Potentially Applicable |
| c) Fugitive Dust Rule 403 | This rule limits on-site activities so that the emissions of fugitive dust from the operation shall not remain visible in the atmosphere beyond the property line of the emission source and the $PM_{10}$ concentration shall not exceed 50 $\mu g/m^2$. This rule also requires reasonable precaution to minimize fugitive dust and the prevention and cleanup of material accidentally deposited on paved streets. | Potentially Applicable |
| d) Particulate Matter (Rule 404) | This rule limits particulate emissions for given volumetric gas flow rates. | Potentially Applicable |
| e) Solid Particulate Matter (Rule 405) | This rule establishes allowable discharge rates for particulates. | Potentially Applicable |
| f) Liquid and Gaseous Air | This rule establishes allowable discharge rates for carbon monoxide and sulfur dioxide. | Potentially |

| Type/Name of Potential ARAR | Description of Requirement and Comments | Status |
|---|---|---|
| Contaminants (Rule 407) | | Applicable |
| g) Circumvention (Rule 408) | This rule prohibits the unauthorized reduction or concealment of an emission. | Potentially Applicable |
| h) Fuel Combustion Contaminants (Rule 409) | This rule limits the emissions of particulate matter from the exhaust of combustion source. | Potentially Applicable |
| i) Sulfur Content of Gaseous, Liquid or Fossil Fuels (Rules 431.1-431.3) | These rules limit sulfur compounds from combustion of gaseous fuels. | Potentially Applicable |
| j) Fuel Burning Equipment – Oxides of Nitrogen (Rule 474) | This rule limits the concentration of oxides of nitrogen from non-mobile fuel burning equipment. | Potentially Applicable |
| 3) Source Specific Standards | | |
| a) Volatile Organic Compound (VOC) Emissions from Decontamination of Soil (Rule 1166) | This rule limits the emissions of VOCs from contaminated soil. | Potentially Applicable |
| 4) New Source Review of Carcinogenic Air Contaminants (Rule 1401) | This rule specifies limits for cancer risk and excess cancer cases from new stationary sources and modifications to existing stationary sources that emit carcinogenic air contaminants. This rule establishes allowable emission impacts for all such stationary sources requiring new permits. Best Available Control Technology for Toxics (T-BACT) will be required for any system where a lifetime maximum individual cancer risk of $10^{-6}$ or greater is estimated to occur. | Potentially Applicable |
| Manifest System, Record Keeping, and Reporting (40 CFR Part 264.70 wt seq.) | Applicable since hazardous waste would be transported off-site for treatment and disposal under certain remedial scenarios. | Potentially Applicable |
| Hazardous Materials Transportation Regulations (49 CFR Parts 107, 171-177) | Applicable if hazardous materials are shipped off-site. | Potentially Applicable |

| Type/Name of Potential ARAR | Description of Requirement and Comments | Status |
|---|---|---|
| California Hazardous Waste Haulers Act (California Health and Safety Code, Section 25161.1, et seq.) | Regulations governing the transportation of hazardous wastes. | Potentially Applicable |
| California Environmental Quality Act (CEQA), Public Resources Code, Division 13, Section 21000 et seq. | According to DTSC guidance, CEQA requires the completion of an Environmental Impact Report (EIR) or issuance of a Negative Declaration before implementation of remedial actions. | Potentially Applicable |
| California Safe Drinking Water and Toxic Enforcement Act of 1986 (H&S Code 25249.5 et seq.; 22 CCR 12000 et seq.) | This rule regulates discharges and exposures of chemicals known to the State of California to be carcinogenic or reproductive toxins. Warnings are required to be provided to individuals exposed to "significant risks." | Potentially Applicable |
| California Occupational Safety and Health Act (OSHA) (Labor Code Section 6300 et seq.; 8 CCR 330 et seq.) | This regulation establishes the requirements for worker safety. All employees working at a Superfund or hazardous waste facility must have adequate 40-hour OSHA training in hazardous materials management | Potentially Applicable |

**Table 4.1**
**Summary of Detailed NCP Evaluation Criteria**
**Davis Chemical**
**1550 N. Bonnie Beach Place**
**Los Angeles, California**

| Criteria | Remarks |
|---|---|
| 1. Overall Protection of Human Health and the Environment | a. Protection of public health<br>b. Protection of the environment |
| 2. Compliance with ARARs | Compliance with chemical-specific, action-specific, and location-specific ARARs and other criteria, advisories, and guidance |
| 3. Long-Term Effectiveness and Performance | a. Magnitude of residual risk<br>b. Adequacy and reliability of controls |
| 4. Reduction of Toxicity, Mobility, and Volume Through Treatment | a. Treatment process used and materials treated<br>b. Amount of hazardous substances destroyed or treated<br>c. Expected reductions in toxicity, mobility, and volume<br>d. Degree to which treatment is irreversible<br>e. Amount of residuals remaining after treatment |
| 5. Short-Term Effectiveness | a. How fast remedial action objectives are achieved<br>b. Protection of residents during remedial actions<br>c. Protection of workers during remedial actions<br>d. Protection of the environment during remedial actions |
| 6. Implementability | a. Availability of goods and services<br>b. Success of technology at similar sites<br>c. Ease of undertaking additional remedial actions<br>d. Ability to monitor effectiveness of remedy<br>e. Ability to obtain approval from agencies<br>f. Availability of off-site treatment, storage, and disposal (TSD) services and capacities |
| 7. Cost | a. Capital costs<br>b. O&M costs<br>c. Present worth costs |
| 8. State Acceptance | DTSC acceptance of preferred remedy for the site |
| 9. Community Acceptance | Community acceptance of preferred remedy for the site |

**Table 4.2: Preliminary Screening of Remedial Alternatives for Effectiveness, Implementability, and Cost**
**Davis Chemical**
**1550 N. Bonnie Beach Place**
**Los Angeles, California**

| Alternative | Criteria | | | Retain Alternative? | Reasons for Excluding (E, I, C) |
|---|---|---|---|---|---|
| | Effectiveness (E) | Implementability (I) | Cost (C) | | |
| **No Action** | Very Low | Very High | Very Low | Yes* | |
| **Excavation and:** | | | | | |
| Off-Site Disposal/Recycling | High | Medium | Very High | No | I, C |
| *Ex Situ* SVE | High | Medium | Medium | No | I, C |
| Off-Site Thermal Desorption | High | Medium | Medium | No | I, C |
| Off-Site Incineration | High | Medium | Very High | No | I, C |
| ***In Situ* SVE** | Medium to High | Medium to High | Medium | No | E, C |
| ***In Situ* SVE Combined with "Hot Spot" Excavation and:** | | | | | |
| Off-Site Disposal/Recycling | High | Medium to High | Low to Medium | Yes | |
| *Ex Situ* SVE | High | Medium to High | Low | Yes | |
| Off-Site Thermal Desorption | High | Medium | Low to Medium | No | I, C |
| Off-Site Incineration | High | Medium | High | No | I, C |

**Notes:**
* "No Action" alternative retained as required by the USEPA presumptive FS Guidance (USEPA, 1993a)
High rankings are desirable for all categories except for cost, for which a low ranking is desirable

**Table 4.3**
**Detailed Evaluation of Alternative 1**
**(No Action)**
**Davis Chemical**
**1550 N. Bonnie Beach Place**
**Los Angeles, California**

**DESCRIPTION OF ALTERNATIVE:** Alternative 1 consists of no further action at the site. Hence, no remedial activities will be undertaken, and the site will be left in its current condition. No monitoring will be conducted and no institutional controls will be put in place to control the future use of the site.

## 1. OVERALL PROTECTION OF HUMAN HEALTH AND THE ENVIRONMENT

**1.a. Protection of public health:** Risks to on-site workers, trespassers, off-site residents, and hypothetical future residents would remain.

**1.b. Protection of the environment:** Contaminated soil at the site may become a long-term and continuing source of contamination to the environment.

## 2. COMPLIANCE WITH ARARS

**Compliance with chemical-specific, action-specific, and location-specific ARARs and other criteria, advisories, and guidance:** Currently, there are no specific chemical quality standards for soils promulgated through federal or state regulations. As such, compliance with ARARs is not applicable for affected soils at the site. The site will continue to pose risks to human health for on-site workers, trespassers, off-site residents, and hypothetical future on-site residents. Many of the COCs at the site will not biodegrade and the principal loss of mass will be only through volatilization. The site may impact underlying ground water.

## 3. LONG-TERM EFFECTIVENESS AND PERMANENCE

**3.a. Magnitude of residual risk:** No change.
**3.b. Adequacy and reliability of controls:** N/A

## 4. REDUCTION OF TOXICITY, MOBILITY, AND VOLUME THROUGH TREATMENT

**4.a. Processes used:** N/A
**4.b. Amount of material destroyed or treated:** None
**4.c. Degree in expected reduction of toxicity, mobility, and volume:** None
**4.d. Degree to which process is irreversible:** N/A
**4.e. Amount of residuals remaining:** N/A

## SHORT-TERM EFFECTIVENESS

- **5.a. How fast RAOs are achieved:** N/A
- **5.b. Protection of workers during remedial actions:** No actions taken.
- **5.c. Protection of residents during remedial actions:** No actions taken.
- **5.d. Protection of the environment during remedial actions:** No action taken.

## 5. IMPLEMENTABILITY

- **6.a. Availability of goods and services:** N/A
- **6.b. Success of technology at similar sites:** N/A
- **6.c. Ease of undertaking additional remedial action, if necessary:** N/A
- **6.d. Ability to monitor effectiveness of remedy:** N/A
- **6.e. Ability to obtain approval from agencies:** Unlikely
- **6.f. Availability of off-site treatment, storage, and disposal services and capacities:** N/A

## 6. COST

- **7.a. Present worth capital costs:** $0
- **7.b. Present worth O&M costs:** $0
- **7.c. Total present worth costs:** $0

## CONCLUSIONS

The "No Action" alternative would not provide any reduction in risks to on-site workers, trespassers, off-site residents, and hypothetical future on-site residents and would not meet the site RAOs. Because the alternative does not meet the threshold criteria of overall protection of human health and the environment, it was dropped from further consideration

**Table 4.4**
**Detailed Evaluation of Alternative 4a**
**(*In Situ* SVE Combined with "Hot Spot" Excavation and Off-Site Disposal/Recycling)**
**Davis Chemical**
**1550 N. Bonnie Beach Place**
**Los Angeles, California**

**DESCRIPTION OF ALTERNATIVE:** Alternative 4a consists of installing and operating an *in situ* soil vapor extraction (SVE) system to remove the soil-bound VOCs, followed by treating the off-gas of the SVE using granular activated carbon (GAC) technology. In addition to this, the most highly contaminated soils (i.e., "hot spots") will be excavated for off-site disposal.

## 1. OVERALL PROTECTION OF HUMAN HEALTH AND THE ENVIRONMENT

**1.a. Protection of public health:** Risks to on-site workers, trespassers, off-site residents, and hypothetical future residents would be reduced to acceptable levels.

**1.b. Protection of the environment:** Risk to the environment from the contamination of soil and the potential migration of the contamination would be reduced to acceptable levels.

## 2. COMPLIANCE WITH ARARS

**Compliance with chemical-specific, action-specific, and location-specific ARARs and other criteria, advisories, and guidance:** Currently, there are no specific chemical quality standards for soils promulgated through federal or state regulations. However, the SCAQMD and the RWQCB requirements for air and soil may apply.

## 3. LONG-TERM EFFECTIVENESS AND PERMANENCE

**3.a. Magnitude of residual risk:** Will significantly reduce residual risk from affected soils.
**3.b. Adequacy and reliability of controls:** Adequate and reliable.

## 4. REDUCTION OF TOXICITY, MOBILITY, AND VOLUME THROUGH TREATMENT

**4.a. Processes used:** *In situ* SVE installation coupled with GAC treatment of off-gas; excavation and off-site disposal of contaminated soil.
**4.b. Amount of material destroyed or treated:** The volume of soil requiring treatment by SVE is estimated to encompass an approximately 5,500 square foot surficial area, to depths ranging from 5 to 30 feet. The volume of soil requiring excavation is estimated to encompass an approximately 30-foot by 20-foot surficial area, to a depth of approximately 15 feet.
**4.c. Degree in expected reduction of toxicity, mobility, and volume:** Substantial reduction.
**4.d. Degree to which process is irreversible:** The processes used are irreversible.

**4.e. Amount of residuals remaining:** It is expected that concentrations in the affected areas will be reduced to levels significantly below the calculated risk-based target concentrations (RBTCs).

## 5. SHORT-TERM EFFECTIVENESS

**5.a. How fast RAOs are achieved:** SVE operations are expected to take approximately 6 to 12 months; excavation will achieve RAOs immediately.
**5.b. Protection of workers during remedial actions:** Anticipated to be acceptable.
**5.c. Protection of residents during remedial actions:** Anticipated to be acceptable.
**5.d. Protection of the environment during remedial actions:** Anticipated to be acceptable.

## 6. IMPLEMENTABILITY

**6.a. Availability of goods and services:** Available.
**6.b. Success of technology at similar sites:** Generally successful.
**6.c. Ease of undertaking additional remedial action, if necessary:** Relatively easy
**6.d. Ability to monitor effectiveness of remedy:** Relative easy through confirmation sampling, which will be conducted during and after operations.
**6.e. Ability to obtain approval from agencies:** Highly likely
**6.f. Availability of off-site treatment, storage, and disposal services and capacities:** N/A.

## 7. COST

| | | |
|---|---|---|
| **7.a. Capital and post-remediation costs:** | \$380,000 | |
| **7.b. Present Value O&M Costs:** | \$48,000 | |
| **7.c. Off-Site Treatment Costs:** | \$0 | |
| **7.d. Total present worth costs:** | \$430,000 | (rounded) |

## CONCLUSIONS

The combined *in situ* SVE and excavation and disposal of "hot spots" meets the primary RAOs for the site and meets the secondary RAO of providing for the development of the Davis site as anticipated by the site's current zoning, meets most of the NCP criteria.

**Table 4.5**
**Detailed Evaluation of Alternative 4b**
**(*In situ* SVE Combined with "Hot Spot" Excavation and *Ex Situ* SVE)**
**Davis Chemical**
**1550 N. Bonnie Beach Place**
**Los Angeles, California**

**DESCRIPTION OF ALTERNATIVE**: Alternative 4b consists of installing and operating an *in situ* soil vapor extraction (SVE) system to remove the soil-bound VOCs, followed by treating the off-gas of the SVE using granular activated carbon (GAC) technology. In addition to this, the most highly contaminated soils (i.e., "hot spots") will be excavated for *ex situ* treatment on-site using SVE. The off-gas from this treatment system will be directed into the same GAC columns used for the *in situ* SVE system.

## 1. OVERALL PROTECTION OF HUMAN HEALTH AND THE ENVIRONMENT

**1.a. Protection of public health:** Risks to on-site workers, trespassers, off-site residents, and hypothetical future residents would be reduced to acceptable levels.

**1.b. Protection of the environment:** Risk to the environment from the contamination of soil and the potential migration of the contamination would be reduced to acceptable levels.

## 2. COMPLIANCE WITH ARARS

**Compliance with chemical-specific, action-specific, and location-specific ARARs and other criteria, advisories, and guidance:** Currently, there are no specific chemical quality standards for soils promulgated through federal or state regulations. However, the SCAQMD and the RWQCB requirements for air and soil may apply.

## 3. LONG-TERM EFFECTIVENESS AND PERMANENCE

**3.a. Magnitude of residual risk:** Will significantly reduce residual risk from affected soils.
**3.b. Adequacy and reliability of controls:** Adequate and reliable.

## 4. REDUCTION OF TOXICITY, MOBILITY, AND VOLUME THROUGH TREATMENT

**4.a. Processes used:** *In situ* SVE installation coupled with GAC treatment of off-gas; excavation and either off-site disposal of contaminated soil from "hot spot" or reuse of such soil at the Site, if accepted by DTSC.
**4.b. Amount of material destroyed or treated:** The volume of soil requiring treatment by SVE is estimated to encompass an approximately 5,500 square foot surficial area, to depths ranging from 5 to 30 feet. The volume of soil requiring excavation is estimated to encompass an approximately 30-foot by 20-foot surficial area, to a depth of approximately 15 feet

**4.c. Degree in expected reduction of toxicity, mobility, and volume:** Substantial reduction.
**4.d. Degree to which process is irreversible:** The processes used are irreversible.
**4.e. Amount of residuals remaining:** It is expected that concentrations in the affected areas will be reduced to levels significantly below the calculated risk based target concentrations (RBCLs).

## 5. SHORT-TERM EFFECTIVENESS

**5.a. How fast RAOs are achieved:** Both *in situ* and *ex situ* SVE operations are expected to take approximately 6 to 12 months.
**5.b. Protection of workers during remedial actions:** Anticipated to be acceptable
**5.c. Protection of residents during remedial actions:** Anticipated to be acceptable.
**5.d. Protection of the environment during remedial actions:** Anticipated to be acceptable.

## 6. IMPLEMENTABILITY

**6.a. Availability of goods and services:** Available.
**6.b. Success of technology at similar sites:** Generally successful
**6.c. Ease of undertaking additional remedial action, if necessary:** Relatively easy
**6.d. Ability to monitor effectiveness of remedy:** Relative easy through confirmation sampling, which will be conducted during and after operations.
**6.e. Ability to obtain approval from agencies:** Highly likely
**6.f. Availability of off-site treatment, storage, and disposal services and capacities:** N/A.

## 7. COST

| | | |
|---|---|---|
| **7.a. Capital and post-remediation costs:** | $292,000 | |
| **7.b. Present Value O&M Costs:** | $48,000 | |
| **7.c. Off-Site Treatment Costs:** | $0 | |
| **7.d. Total present worth costs:** | $340,000 | (rounded) |

## CONCLUSIONS

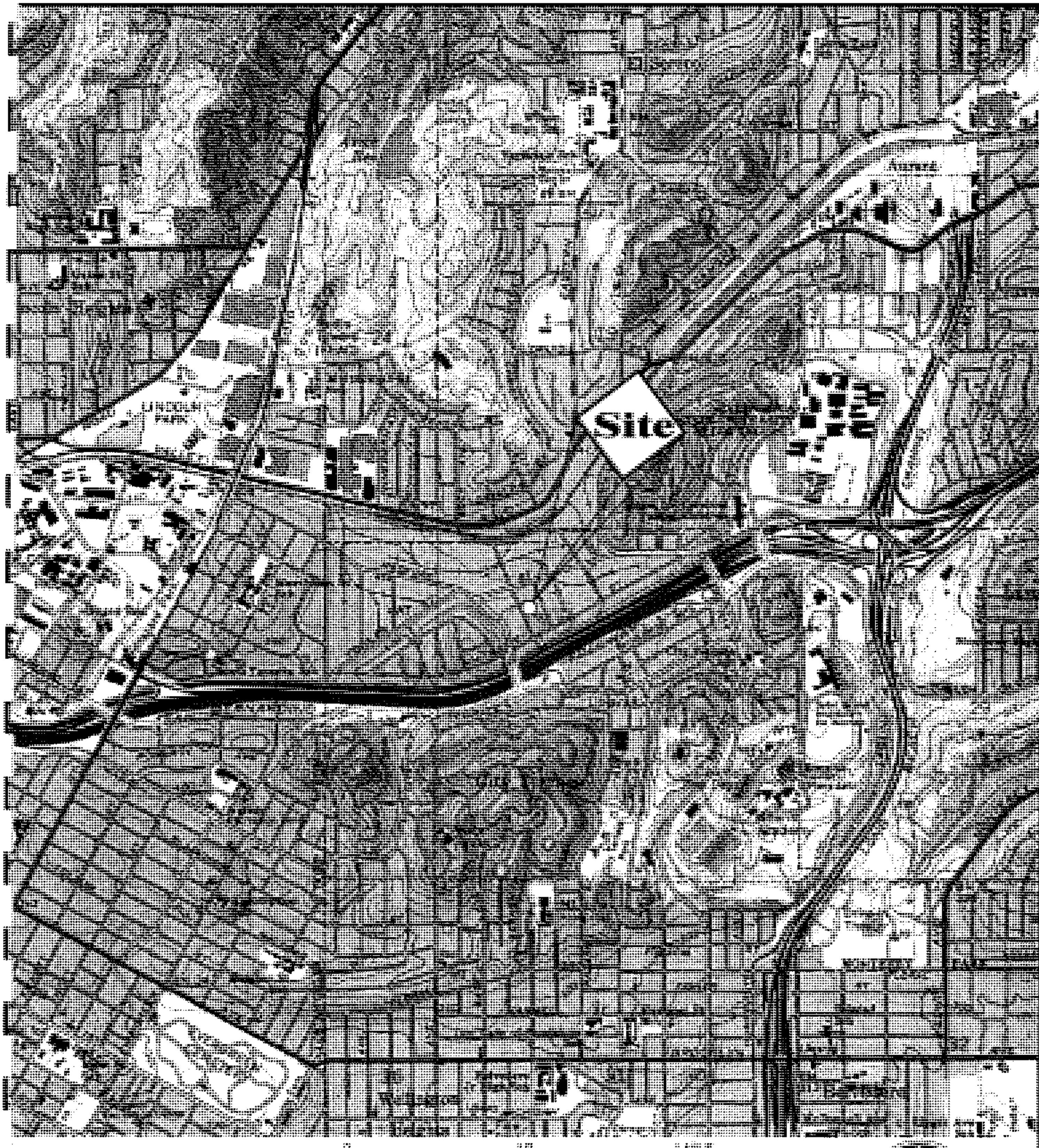
The combined *in situ* SVE and excavation and on-site and *ex situ* SVE meets the primary RAOs for the site and meets the secondary RAO of providing for the development of the Davis site as anticipated by the site's current zoning, meets most of the NCP criteria.

**Table 4.6: Relative Performance of the Remedial Alternatives against the Nine NCP Criteria**
**Davis Chemical**
**1550 N. Bonnie Beach Place**
**Los Angeles, California**

| | NCP Criteria | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | Overall Protection of Human Health and the Environment | Compliance with ARARs | Long-Term Effectiveness and Performance | Reduction of Toxicity, Mobility, and Volume Through Treatment | Short-Term Effectiveness | Implementability | Cost* | State Acceptance | Community Acceptance |
| **Alternative 1** | Very Low | Very Low | N/A | N/A | Very Low | Very High | Very Low | Very Low | Very Low |
| **Alternative 4a** | Low | High | High | Low | High | Medium to High | Low to Medium | High | High |
| **Alternative 4b** | High | High | High | High | High | Medium to High | Low | High | High |

**Notes:**
* = High rankings are desirable for all categories except for cost, for which a low ranking is desirable
N/A = Not Applicable

# FIGURES




0 1/2 1 MILE

1000 0 2000 4000 FEET

SOURCE:
U.S.G.S. 7.5 minute series (topographic)
Los Angeles Quadrangle, CA. current as of 1994

CONTOUR INTERVAL 40 FEET
DOTTED LINES REPRESENT 10-FOOT CONTOURS
NATIONAL GEODETIC VERTICAL DATUM OF 1929
SCALE 1:24000

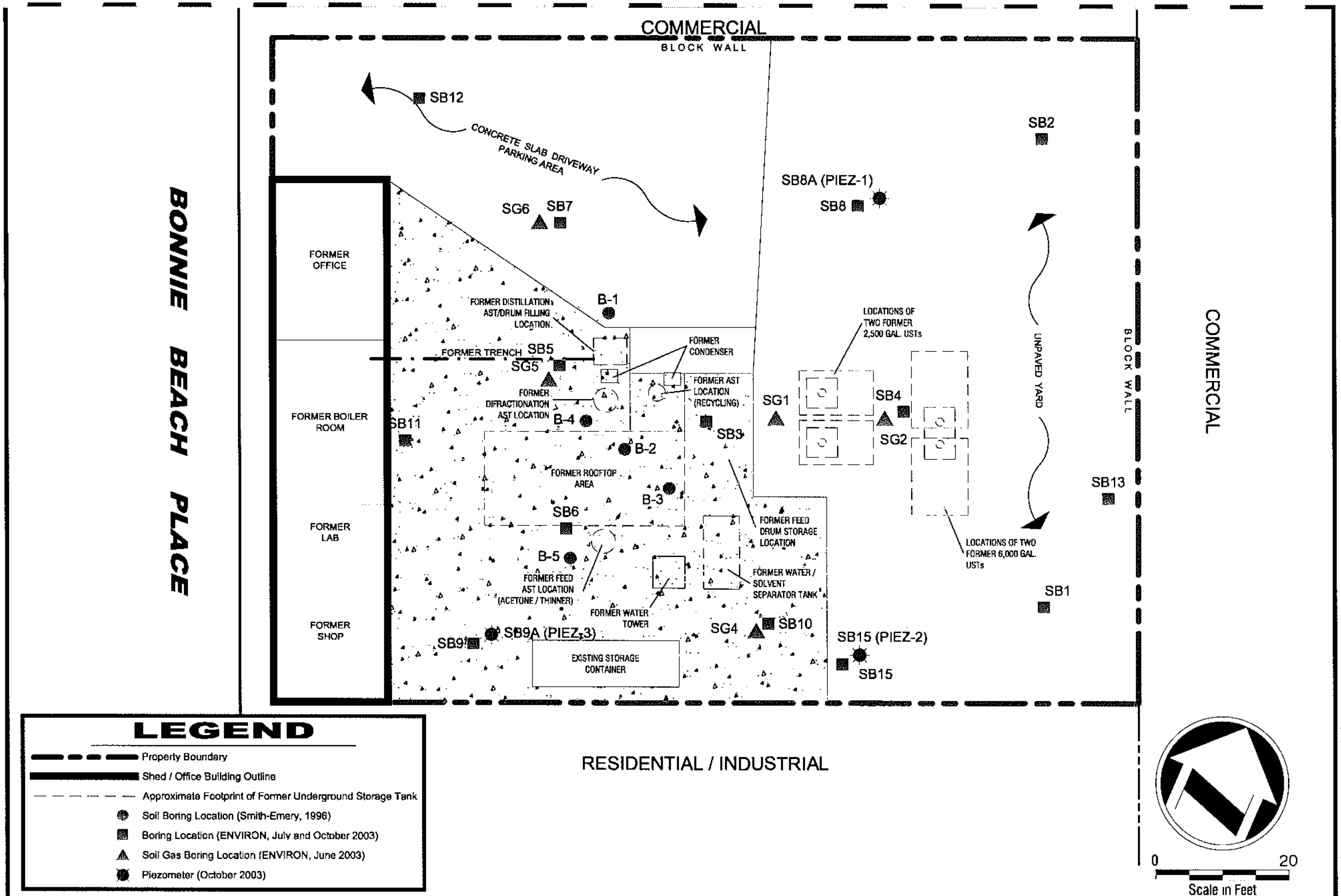
ENVIRON

# Site Vicinity Map

**1550 N. Bonnie Beach Place**
**Los Angeles, California**

Figure
**1**

Drafter: JJC Date: 3/24/03 Contract Number: 04-11147A Approved: Revised: 10/07/03




ENVIRON

# Site Plan with Sample and Piezometer Locations

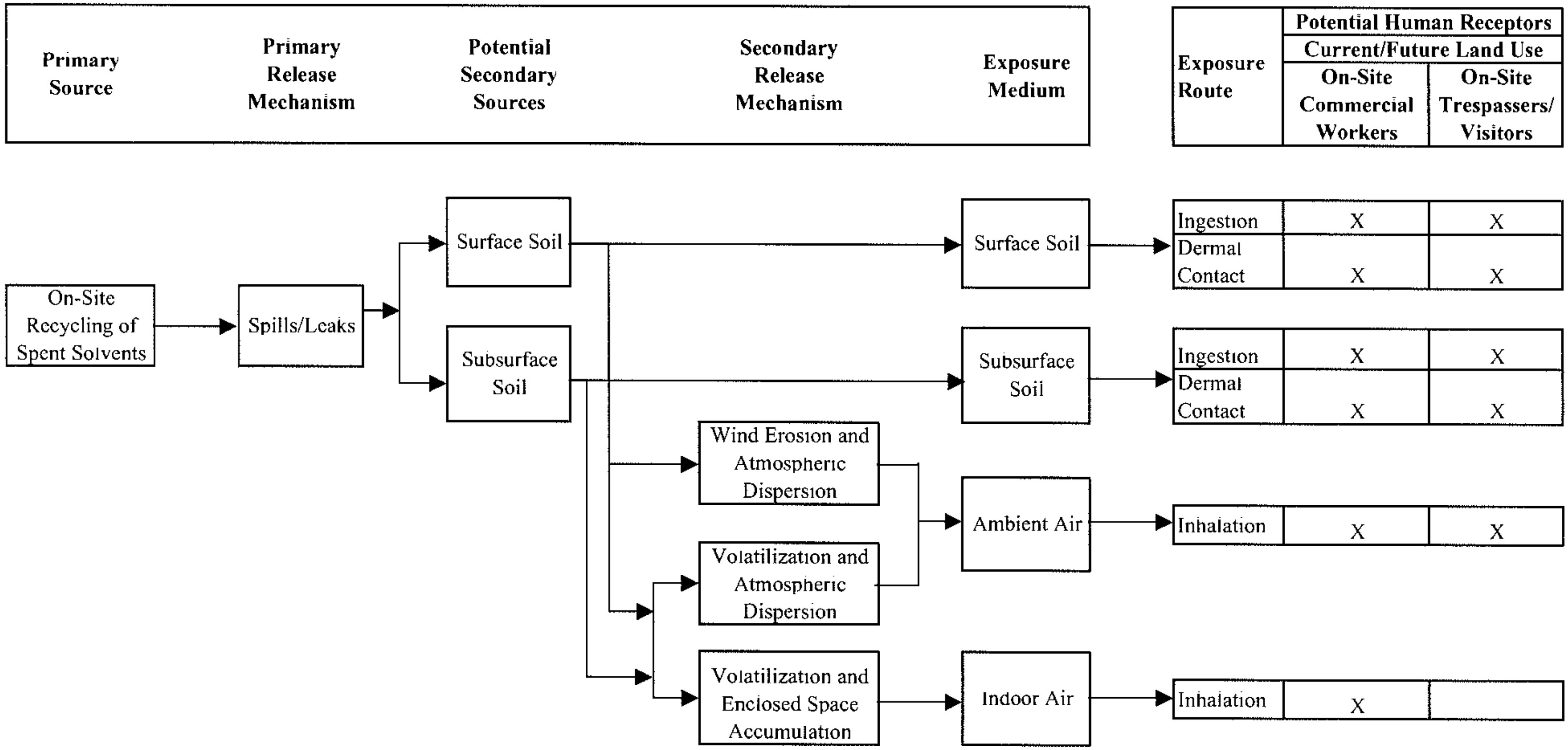
**1550 N. Bonnie Beach Place**
**Los Angeles, California**

**Figure 2**

Drafter: JJC Date: 2/15/05 Contract Number: 04-11147A Approved: Revised:

FILE: P:\D\DAVIS CHEMICAL\DRAWINGS\11147AF2F

## FIGURE 3
## Conceptual Site Model
## 1550 N. Bonnie Beach Place
## Los Angeles, California




Explanation:
X Potentially complete exposure pathways for further consideration.

# APPENDIX A

**Cost Breakdown of Removal Action Alternatives**

## Alternative 4a: *In Situ* SVE Combined with Excavation and Disposal/Recycling
## Davis Chemical
## 1550 N. Bonnie Beach Place
## Los Angeles, California

| Item Description | Unit | Quantity | Unit Rate | Subtotal | Assumptions/Notes: |
|---|---|---|---|---|---|
| **Capital Costs:** | | | | | |
| **SVE System** | | | | | |
| System Permitting | EA | 1 | 15,000 | $15,000 | SCAQMD and local permits |
| Rental of Vapor GAC Beds | M | 12 | 500 | $6,000 | Rental of 2 1,000-lb beds @ $500 per month |
| Rental of SVE unit | M | 12 | 2,000 | $24,000 | Estimated |
| GAC (in pounds) | EA | 6,000 | 1.00 | $6,000 | Estimated 2 changeouts per carbon vessel during remediation |
| Installation/Development of Wells | EA | 5 | 2,000 | $10,000 | Estimate for 5 wells (2" PVC Schedule 40) |
| Logging by Geologist | HRS | 40 | 100 | $4,000 | Oversight and logging during well installation |
| Remediation Construction | EA | 1 | 15,000 | $15,000 | Estimated |
| Electrical Hookup | EA | 1 | 5,000 | $5,000 | Subcontractor's Estimate |
| **Excavation** | | | | | |
| Permitting for excavation | EA | 1 | 3,000 | $3,000 | Subcontractor's Estimate |
| Excavation | EA | 1 | 25,000 | $25,000 | Subcontractor's Estimate |
| Transportation and Disposal of Haz Waste | EA | 1 | 82,500 | $82,500 | Subcontractor's Estimate |
| Importing, backfilling and compacting clean backfill | EA | 1 | 9,500 | $9,500 | Subcontractor's Estimate |
| **CAPITAL COSTS SUBTOTAL** | | | | **$205,000** | **Rounded** |
| Engineering Design (15%) | | | | $30,800 | Rounded |
| Project Management (20%) | | | | $41,000 | Rounded |
| Contingency (20%) | | | | $41,000 | Rounded |
| **TOTAL CAPITAL COSTS** | | | | **$318,000** | **Rounded** |
| | | | | | |
| **Annual O&M Costs:** | | | | | |
| Vapor Sampling: VOCs | EA | 45 | 200 | $9,000 | Startup and monthly O&M sampling |
| Engineer | | 252 | 100 | $25,200 | Engineer's Estimate. 60 hours for startup +16 hours per month |
| **ANNUAL O&M COSTS SUBTOTAL** | | | | **$35,000** | **Rounded** |
| Reporting (15%) | | | | $5,300 | Rounded |
| Project Management (20%) | | | | $7,000 | Rounded |
| **TOTAL ANNUAL O&M COSTS** | | | | **$48,000** | **Rounded** |

## Alternative 4a: *In Situ* SVE Combined with Excavation and Disposal/Recycling
## Davis Chemical
## 1550 N. Bonnie Beach Place
## Los Angeles, California

| Item Description | Unit | Quantity | Unit Rate | Subtotal | Assumptions/Notes: |
|---|---|---|---|---|---|
| **Post-Remediation Costs:** | | | | | |
| Confirmation Sampling | EA | 1 | 15,000 | $15,000 | Drilling, sampling and analytical laboratory costs |
| Well Abandonment | EA | 5 | 500 | $2,500 | Estimated |
| Well Destruction Permits | EA | 5 | 150 | $750 | Estimated |
| Demob Contractor | EA | 1 | 15,000 | $15,000 | Estimated |
| | EA | 1 | 3,500 | $3,500 | Estimated |
| **POST-REMEDIATION COSTS SUBTOTAL** | | | | **$37,000** | **Rounded** |
| Engineering Oversite (10%) | | | | $3,700 | Rounded |
| Reporting (15%) | | | | $5,600 | Rounded |
| Project Management (20%) | | | | $7,400 | Rounded |
| Contingency (20%) | | | | $7,400 | Rounded |
| **TOTAL POST-REMEDIATION COSTS** | | | | **$62,000** | **Rounded** |
| | | | | | |
| **TOTAL COSTS** | | | | **$430,000** | **Rounded** |

**Notes:**

EA = Each

GAC = Granular Activated Carbon

HRS = Hours

M = Month

O&M = Operations and Maintenance

SCAQMD = South Coast Air Quality Management District

SVE = Soil Vapor Extraction

VOC = Volatile Organic Compounds

## Alternative 4b: *In Situ* SVE Combined with Excavation and *Ex Situ* SVE
## Davis Chemical
## 1550 N. Bonnie Beach Place
## Los Angeles, California

| Item Description | Unit | Quantity | Unit Rate | Subtotal | Assumptions/Notes: |
|---|---|---|---|---|---|
| **Capital Costs:** | | | | | |
| **SVE System** | | | | | |
| System Permitting | EA | 1 | 15,000 | $15,000 | SCAQMD and local permits |
| Rental of Vapor GAC Beds | M | 12 | 500 | $6,000 | Rental of 2 1,000-lb beds @ $500 per month |
| Rental of SVE unit | M | 12 | 2,000 | $24,000 | Estimated |
| GAC (in pounds) | EA | 6,000 | 1.00 | $6,000 | Estimated 2 changeouts per carbon vessel during remediation |
| Installation/Development of Wells | EA | 5 | 2,000 | $10,000 | Estimate for 5 wells (2" PVC Schedule 40) |
| Logging by Geologist | HRS | 40 | 100 | $4,000 | Oversight and logging during well installation |
| Remediation Construction | EA | 1 | 15,000 | $15,000 | Estimated |
| Electrical Hookup | EA | 1 | 5,000 | $5,000 | Subcontractor's Estimate |
| **Excavation** | | | | | |
| *Ex Situ* SVE system | EA | 1 | 43,000 | $43,000 | Includes permitting, mobilization, shoring, excavation, and SVE |
| Transportation and Disposal of non-Haz Waste | EA | 1 | 10,450 | $10,450 | Subcontractor's Estimate |
| Importing, backfilling and compacting clean backfill | EA | 1 | 9,500 | $9,500 | Subcontractor's Estimate |
| | | | | | |
| **CAPITAL COSTS SUBTOTAL** | | | | **$148,000** | **Rounded** |
| Engineering Design (15%) | | | | $22,200 | Rounded |
| Project Management (20%) | | | | $29,600 | Rounded |
| Contingency (20%) | | | | $29,600 | Rounded |
| **TOTAL CAPITAL COSTS** | | | | **$230,000** | **Rounded** |
| | | | | | |
| **Annual O&M Costs:** | | | | | |
| Vapor Sampling: VOCs | EA | 45 | 200 | $9,000 | Startup and monthly O&M sampling |
| Engineer | | 252 | 100 | $25,200 | Engineer's Estimate. 60 hours for startup +16 hours per month |
| **ANNUAL O&M COSTS SUBTOTAL** | | | | **$35,000** | **Rounded** |
| Reporting (15%) | | | | $5,300 | Rounded |
| Project Management (20%) | | | | $7,000 | Rounded |
| **TOTAL ANNUAL O&M COSTS** | | | | **$48,000** | **Rounded** |
| | | | | | |

**Alternative 4b: *In Situ* SVE Combined with Excavation and *Ex Situ* SVE**
**Davis Chemical**
**1550 N. Bonnie Beach Place**
**Los Angeles, California**

| Item Description | Unit | Quantity | Unit Rate | Subtotal | Assumptions/Notes: |
|---|---|---|---|---|---|
| **Post-Remediation Costs:** | | | | | |
| Confirmation Sampling | EA | 1 | 15,000 | $15,000 | Drilling, sampling and analytical laboratory costs |
| Well Abandonment | EA | 5 | 500 | $2,500 | Estimated |
| Well Destruction Permits | EA | 5 | 150 | $750 | Estimated |
| Demob Contractor | EA | 1 | 15,000 | $15,000 | Estimated |
| Disposal of Waste | EA | 1 | 3,500 | $3,500 | Estimated |
| **POST-REMEDIATION COSTS SUBTOTAL** | | | | **$37,000** | **Rounded** |
| Engineering Oversite (10%) | | | | $3,700 | Rounded |
| Reporting (15%) | | | | $5,600 | Rounded |
| Project Management (20%) | | | | $7,400 | Rounded |
| Contingency (20%) | | | | $7,400 | Rounded |
| **TOTAL POST-REMEDIATION COSTS** | | | | **$62,000** | **Rounded** |
| | | | | | |
| **TOTAL COSTS** | | | | **$340,000** | **Rounded** |

**Notes:**
EA = Each
GAC = Granular Activated Carbon
HRS = Hours
M = Month
O&M = Operations and Maintenance
SCAQMD = South Coast Air Quality Management District
SVE = Soil Vapor Extraction
VOC = Volatile Organic Compounds